SEPTEMBER, 1951

American Engineer

NATIONAL DEFENSE ISSUE

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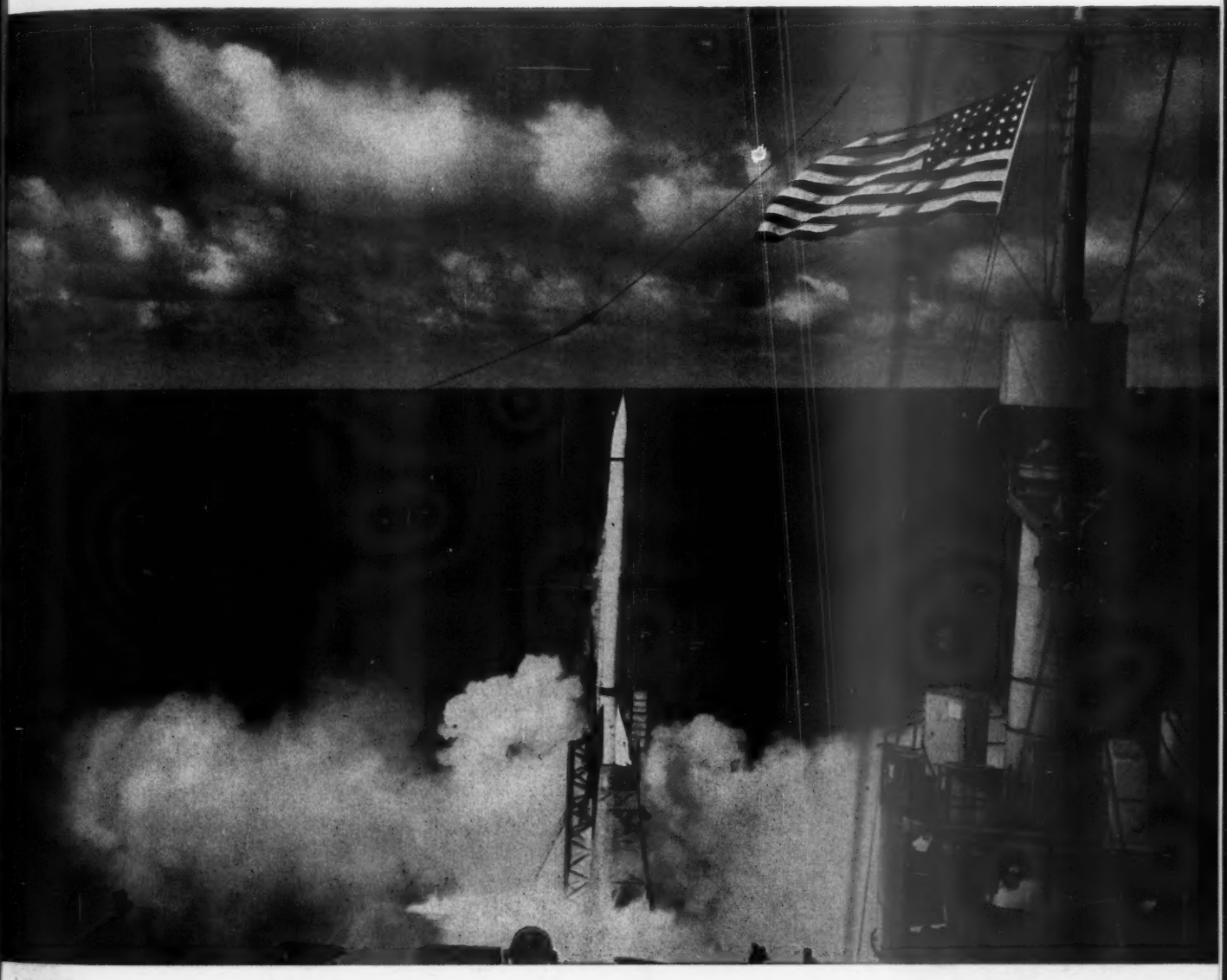

Don't Miss These Exclusive Articles:

- ► A Complete Report on the Auto Industry's Conversion to Defense
- ► An Interview with Engineer T. Keith Glennan, Atomic Energy Commissioner
- ► Major Alexander P. de Seversky's Double-length Article That Criticizes Our Defense Setup
- ► Engineers and Civil Defense with Millard Caldwell, Administrator, Civil Defense Agency

. . . And These Special Features

- An introduction by ODM's Charles E. Wilson
- A message from GM's Charles E. Wilson
- A Glenn L. Martin Photo Story
- Late Washington Report for Engineers

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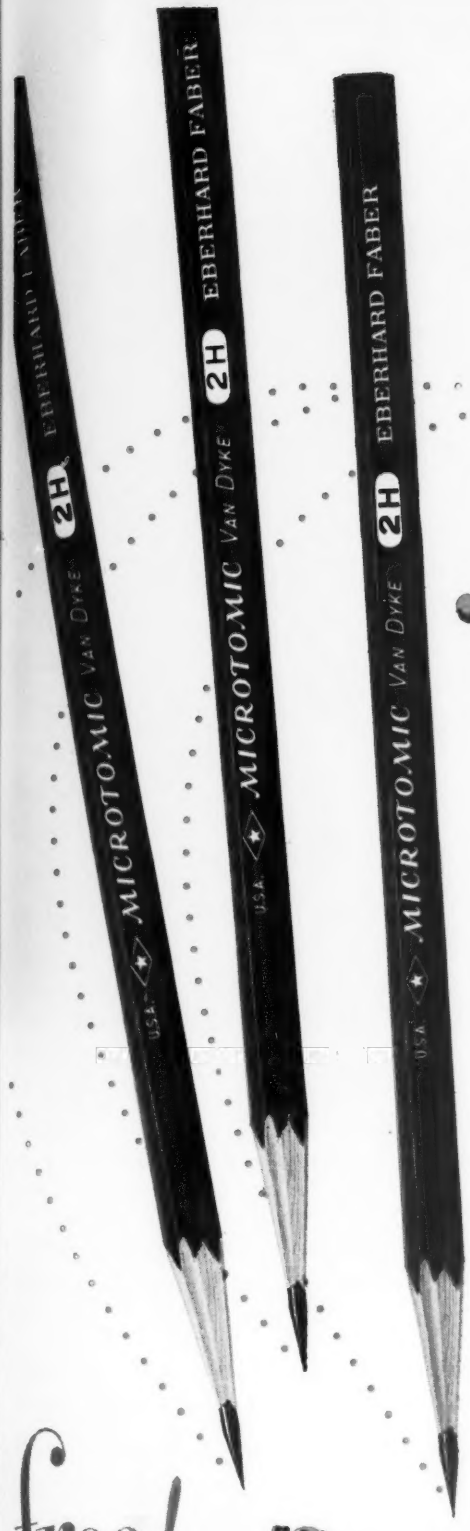

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NATIONAL DEFENSE ISSUE

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A Message From Charles E. Wilson

WITH our nation mobilizing all its resources for defense against military aggression, the engineer, as always, is to be found in the vanguard of our amassment of genius and skills.

We have summoned to the cause the know-how and executive talents of many from the engineering profession and they are responding nobly. That response is written, for example, in the new and improved military weapons our defense plants are now turning out.

I have said that the key to our military strength, as with our economic strength, is production. And production is more surely up to the engineer than it is to any other individual in the entire production scheme.

Being an engineer denotes highly specialized training and ability. It denotes responsibility, too—the responsibility for inventing tools, designing them, and seeing that they work. Without the engineer's great devotion to his profession this nation could not have built the superb mechanical techniques which have engendered the admiration of the world. His talents are all the more needed now that the nation stands in peril of military aggression. For in our ability to produce more and better weapons than our potential foe lies the answer to whether we shall survive as a nation or go down in defeat and oblivion.

There is an additional responsibility that devolves upon the individual engineer in these trying times. That is to see to it that his own efforts are used, wherever possible, to the best advantage in solving the problems of our defense mobilization. This program cannot be achieved at once and the energies of as many skilled men as are willing to lend a hand are urgently needed and can be of the highest value.

CHARLES E. WILSON,
Director of Defense Mobilization.

★ ★ ★ ★ ★ ★

American Engineer

NATIONAL DEFENSE ISSUE

"... to be remembered"

"Let us develop the resources of our land, call forth its powers, build up its institutions, promote all its great interests, and see whether we also, in our day and generation, may not perform something worthy to be remembered." — *Daniel Webster.*

Kenneth E. Trombley, Editor

●

Barbara Haislip, Assistant to the Editor

●

David A. Heller, Staff Writer

●

Arthur F. Beck, Business Manager

●

George J. Nicastro, Chairman, Publications Committee, NSPE

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SEPTEMBER, 1951

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A professional engineer's philosophy

By

L. L. Dresser, P.E.,

President, N.S.P.E.

A JOB is a job—but a profession—that's something else again. A profession is a trust. A profession is a public service automatically assumed.

Yes, any professional man is a public servant—automatically assumed. A job is something that you do more or less because you have to do it to eat regularly—but a professional man not only serves when called, but looks ahead to see how his work can improve conditions in this world of ours. He then forges ahead of the call to do his bit. A professional man is equipped with *both* the tools of doing the job and with a desire to leave the world a better place for his having lived.

In fact, I sometimes settle back in my chair—in those moments when reflections on life come easily—and think that perhaps a philosophy is more important to an engineer than technical know-how. Then again I think, maybe that's going a bit too strong. This I do know—to have technical knowledge by itself is not enough. To have technical know-how alone gives the engineer his tools, but does not tell him how to use them. To have just technical ability gives the engineer a view of the job only—he has no view of the service to mankind that is his. To have technical training alone equips the engineer as a doer of jobs—not as a professional man.

Yes, it is the engineer's philosophy that makes the difference between job and profession.

Applied to this world we see how important it is to be truly professional in our outlook.

Let's look at this country of ours—how is it different from others—why can we say with meaning that it is the greatest country on the face of this globe?

I was topping a few scudding clouds in my plane the other day, flying 4,000 feet up—heading for my ranch in Southern Oklahoma. As I always do, I looked about me at man's handiwork—and likewise I looked at some of man's undoing of Nature's handiwork. And I got to thinking about the bridges I saw and the tall buildings and the oil refineries and cracking plants, and even the windmills and the rural electrical lines—yes, and the tractor and the plow. I got to reflecting about the development in this country, a Republic that is less than two hundred years old. Why is our Nation so far ahead of the old countries—countries that have been populated for centuries. Why is the standard of living where it is today in this part of the world? Certainly not because we have more natural resources. And, probably not because we have greater engineers—they have some of the top scientists and technologists in those countries.

Then, I began to come out of the clouds and realize that one thing was the difference—our engineers have a greater philosophy. I began to say to myself: "But for the engineer and his philosophy, this country would be like any under-developed country. They have the natural resources, but get the use of only those things that the human body itself can convert. They don't have the assistance of our professional engineering incentive to serve their fellow men. They don't have the influence of our professional engineering desire to do more than just finish the bare essentials of the job. They don't have men who consider their position in this world as a trust—a public service—automatically assumed."

About This Issue...

Creating a professional magazine every month is always a satisfying duty, the common trials inherent in the publications business notwithstanding. But this month's issue of the AMERICAN ENGINEER confronted us with an even greater challenge inasmuch as we attempted, successfully we think, to devote an entire issue to one theme, and still make every piece original in its treatment of a certain phase of the vast defense picture.

Would you like a little history of some of the stories? Well, Dave Heller, a new and welcome addition to the staff, ferreted out his material for the story on the conversion of the auto industry to defense, by working closely with the Automobile Manufacturers' Association, General Motors, and many others. It's a factual story by a competent reporter—don't skip it.

Senator Brien McMahon recently called the Atomic Energy Commission the "finest professional staff in Washington." Because two professional engineers are members of this group, we felt that no Defense Issue would be complete without a talk with one of them. We interviewed Commissioner T. Keith Glennan, who is on leave as president of Case Institute, and we found a man who not only knew all about engineers in the AE program, but who feels that helping the profession progress is a part of his life's work.

Major Alexander P. de Seversky needs no introduction. For years he has waged a courageous but often lonely battle to wake people up to the value of air power. Well, he's still going strong despite his success in selling many on his convictions, and it's every editor's dream to secure an original story from him. It wasn't easy—getting the story we mean. The Major is a busy man and if it hadn't been for the diligent efforts of Frank M. Billhimer, President of the New York Chapter of the New York SSPE, we might not have succeeded.

We're almost out of space here and only half way through the issue. But we must thank Perry Ford, former NSPE president, for his cooperation on the civil defense story.

But don't miss Staffer Barbara Haislip's Martin picture story, the piece by NAM's President Ruffin, or the educational story by Tuft's President Carmichael. The cover? A rocket launching at sea.

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Detroit Is Again The Center of Things . . .

The Auto Industry Converts To Defense

By David A. Heller,
Staff Writer

Professional engineers like these at Cadillac get set for defense work.

EARLY in 1942, when America was being subjected to a series of humiliating defeats at the hands of the Axis, Lt. Gen. Brehon B. Somervell, Commanding General of the Army Supply Services, made a tour of the automobile industry in Detroit. Seeing the work being done to convert the vast factories to war production, Gen. Somervell prophesied:

"The road ahead is dim with the dust of battles still unfought. How long that road is, no one can know. But it is shorter than it would have been had not our enemies misjudged us and themselves. For, when Hitler put his war on wheels, he ran it straight down our alley. When he hitched his chariot to an internal combustion engine, he opened up a new battle front—a front we know well. It's called Detroit."

In the language of Hollywood, the achievements of the automobile industry during World War II were "supercolossal." The industry made 100% of the armored cars, 57% of the tanks, 56% of the carbines, 47% of the machine guns. It produced 87% of the aircraft bombs, 85% of the army's helmets, 92% of the scout cars and carriers. It made substantial amounts of torpedos, mines and millions of other items eaten up by the greedy maw of war.

What was true during World War II is equally true today. One of the battlefields of Korea is the Michigan auto center. If we are successful in thwarting the aggressive designs of the Russians as we were the Germans and the Japanese, the productive facilities of Detroit and the automobile industry will play an important part.

How is the tooling up for World War III (if it is to come) proceeding? What part are engineers playing in the process? What are some of the headaches of conversion to defense?

In cooperation with the Automobile Manufacturers' Association, the AMERICAN ENGINEER has completed a survey of the automobile industry's re-entry into defense production and brings to its readers an up-to-the-minute report of what's going on in Detroit.

Two immense, glaring facts are at once apparent. These are: (1) That today's problem in Detroit is not how to get the production out, but rather one of cutting back production and still retaining production lines and full employment in many cases, and (2) that today's partial mobilization effort is a lot different from the all-out effort of World War II. For one thing, it's far smaller, only a fraction of the war material being needed now that was required then. The aim of America's war production effort is, in most cases, not *production*, but *production lines*.

John D. Small, Chairman of the Defense Department's powerful Munitions Board, pointed up this fact in a recent speech. "We do not want to spend our resources making a lot of military 'hardware' that is likely to stand on the shelf and become obsolete," he said. "We want to spend our resources establishing and maintaining up-to-date production lines which can be shifted to high-speed production of the latest equipment in the shortest possible time when and if it becomes necessary."

The implications of this statement are enormous, to all American industry, to engineers, and to the automobile industry.

It means, for example, that instead of building enormous quantities of tanks, our production effort is geared to producing only the tanks we need to support our armies and to keeping production lines for tanks constantly modern and up-to-date. This means that in most cases increased defense production has not taken up the slack caused by decreased civilian production due to cut-back orders ordered by the National Production Authority to conserve scarce metals.

A GLANCE at the figures showing the capacity of the industry being utilized for defense purposes is revealing. During World War II, more than 80% of the automobile industry's entire capacity was devoted to defense. Today in response to a query by the Automobile Manufacturers' Association, General Motors reports that 10% of its capacity is devoted to direct defense work and 15% to defense-supporting work. For Ford, the figures are one per cent on defense production and seven per cent for defense-supporting. On the basis of floor space assigned, Chrysler reports figures of 10 and 9 per cent.

Under the Controlled Materials Plan, the National Production Authority has allotted the automobile industry enough steel, copper and aluminum to produce 1,100,000 cars during the fourth quarter of this year. That is only 60% of the production level of the average of the first two quarters of 1950.

In the absence of huge-scale war orders from the military, unemployment (mostly prospective) due to production cutbacks from materials scarcity, is causing sleepless nights in the Motor City. From an engineering standpoint, of course, it would be the height of national folly to allow the matchless productive facilities of Detroit to stand idle at a time when the utmost production is needed. It seems only a question of time until the slack is taken up in converting auto production to some other kind of production. The question is: What?

Both labor and management in the industry have come up with an answer. Machine tools. More specifically, components for machine tools. The critical shortage of such tools has been termed "the No. 1 bottleneck in defense production" by the National Production Authority.

The seriousness of the shortage is apparent when one considers that machine tools are productive equipment and that products the machines will produce obviously cannot be made until a considerable time after the machine tools themselves have been produced and installed.

SUCH strange bedfellows as Walter Reuther, President of the United Automobile Workers Union and Charles E. Wilson, President of General Motors, Henry Ford of the Ford Motor Company and other "big wheels" on the management side of the industry, are now uniting to urge the National Production Authority to use the auto industry's productive capacity to break the shortage.

The program is important for engineers. If adopted, the engineering know-how necessary to adapt the auto indus-

▲ **These J33 turbo-jet engines are being made ready for the test stands at the Allison Division works of GM. The engine has 5400 pounds of thrust and powers jet fighters.**

◄ **View of the final assembly line in the Cleveland tank plant of the Cadillac Motor Car Division of General Motors. The plant is producing Walker Bulldog T41E1 tanks with 76-mm. guns.**

▼ **W. N. Pearson, left, director of manufacturing for Speed Queen Corporation, Ripon, Wis., spots a part which he says his firm can manufacture from among the hundreds needed for the Pratt and Whitney aircraft engines Ford will build in Chicago. With him is M. G. Peterson, a Ford buyer.**

try's tool shops which build and repair jigs, dies, tools, fixtures and patterns to components for machine tools would be enormous.

The entire automobile industry is highly dependent on engineers, both in peacetime and wartime. Asked by the AMERICAN ENGINEER at what steps the industry was most dependent on engineers, a spokesman for the industry said "Everything in the business is engineers. We can't take a step anywhere without engineers."

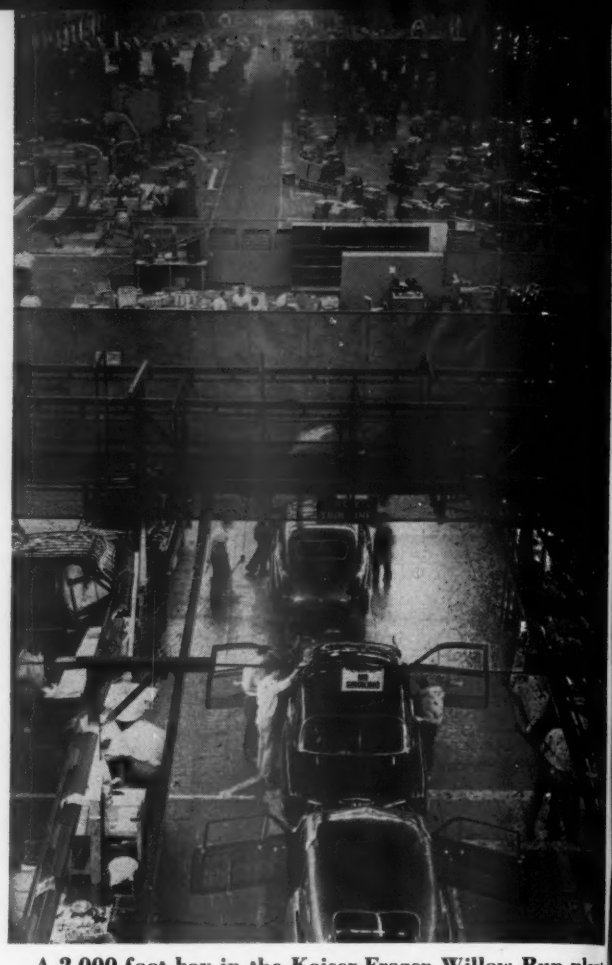
What are some of the headaches the industry has in converting to defense which engineers are helping to solve? A survey by the Automobile Manufacturers' Association reveals that the additional precision required by the current effort as compared with World War II is the biggest engineering problem. Jet engines, for example, require extremely high precision. So does the gearing in the new-type tank turrets. So does electronics control equipment now used with most mechanical equipment.

Appreciation of some of the engineering problems involved in making military trucks, which must perform well anywhere and on any kind of terrain, military tactical vehicles, jet engines, rockets, tanks, cargo aircraft, reciprocating airplane engines, guns and other products has caused military observers to call the engineering achievements "near miraculous."

Executives of the industry report that there is a shortage of all types of engineers with design, hydraulic, and tool engineers in especially short supply. One of the biggest engineering problems the industry faces is devising suitable substitutes for materials in critically short supply. The copper and nickel shortage, for example, has been greatly eased by reduction in use, and in some cases, near elimination, in automobile manufacture.

Eloquent praise to the engineering genius of the industry was given recently by Defense Mobilizer Charles E. Wilson. Testifying before a closed session of the House of Representatives Appropriations Committee, Wilson, alluding to electronic devices used on airplanes said: "My God! They are conceiving things that are just amazing, but awfully intricate to build. Sometimes electronic equipment for use on airplanes now costs more than the entire plane cost during the last war. I have to be briefed two or three times a week just to keep up."

The relationship between the automobile industry and the aircraft industry is a subtle and delicate one, based on involved subcontracting procedures. If the car makers move into the machine tool business (as it seems they will) the same pattern of subcontracting would seem likely to set the keynote for their efforts.

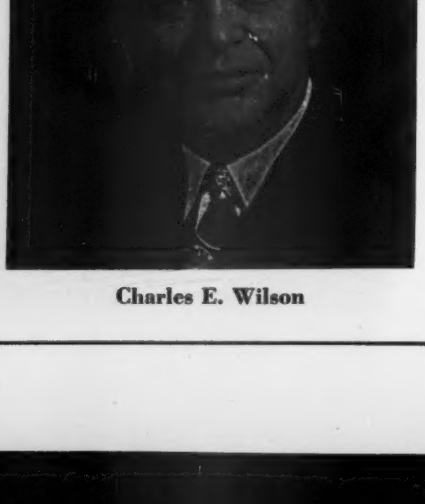


A 2,000-foot bay in the Kaiser-Frazer Willow Run plant showing Kaiser and Henry J automobiles on the trim assembly line against a background of hundreds of milling and fabricating machines for aircraft production.

SUBCONTRACTING was (and is) the key to much of the gigantic contributions of the automobile industry to defense production, during World War II. Early in the war when all was chaos and confusion, the industry took on the stupendous job of undertaking to supply the aircraft in-

(Continued on page 31)

Charles E. Wilson, President of General Motors, says—



Charles E. Wilson

"No modern nation can win a war. The only hope for the world is through education and a better understanding, starting in our own communities and broadening out through our country and throughout the world. When we realize that none of us can live by his own efforts alone, that we are dependent upon one another, and that we must develop a spirit of cooperation to live and let live, then there will be an absence of hate and fear. . . . in the meantime, our country will have to stay sufficiently armed to defend itself."

"I think that some Americans are disillusioned. After you free some people, they can't step up and take the responsibility that goes with freedom. A free society must be a tolerant, understanding, educated society. It must be based on . . . common ethical and moral codes that develop responsibility, self-restraint, and a recognition of the rights of others."

Dr. Glennan

AN AMERICAN ENGINEER INTERVIEW

with

Dr. T. Keith Glennan

an engineer who is a Commissioner with the Atomic Energy Commission, and on leave as President of famous Case Institute of Technology

Q. *Most of our questions, Dr. Glennan, are concerned with the training and utilization of professional engineers in the atomic energy industry. As a starter, how many engineers are now employed in the program?*

A. About 4,000. This includes engineers working directly for the Atomic Energy Commission and those employed by our operating contractors. It does not count the large number working for contractors on construction in progress at our installations.

This 4,000 figure is about half of the total of scientific and technical personnel working in the government's atomic energy program. That certainly shows the importance of the engineering profession in our work. Within the AEC itself, we have 436 persons who hold engineering degrees. The rest are with our contractors.

I'd like to say a word about how the AEC utilizes its own engineers. Of the 436, there are only 23 who are not actually working at engineering jobs. All but one of these 23 are holding important high-level positions such as branch chiefs, area managers and the like. Our experience is like that of industry generally in that the tendency is for engineers to move up into management.

Q. *What about the future, as far as the AEC is concerned?*

A. Predictions in any business are a hazard. That goes double for the atomic energy industry. But at this point, it looks as if we will have need for a total of 5,500 to 6,000 engineers working in the operating program by 1953. As more plants and their supporting facilities are put into operation, it is going to take more engineers to run them.

Q. *How do you go about getting the engineers you need?*

A. I think the AEC and its contractors follow pretty much the same methods as are used in industry. Each contractor is responsible for hiring his own staff but the techniques appear to be similar throughout the program.

For the recent graduate, we visit the colleges and universities. We tell college placement centers about specific openings and direct applications are accepted through regular government channels.

Other contacts are kept up through the AEC research contracts with educational institutions and research centers; through the fellowship programs, and by close contact with the professional and technical groups. I do not believe these practices depart very much from regular industrial procedures.

Some of our contractors use special pamphlets, illustrated brochures, etc. This literature describes the work of the specific organization and in some cases, tells of the attractiveness of the communities where the work is carried on.

Q. *What kinds of engineers do you need and in what phases of the program are they used?*

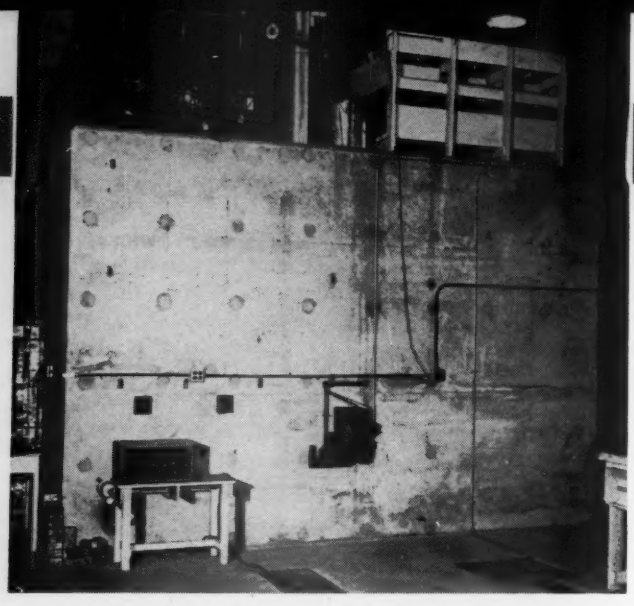
A. The answer to the first part of that question is just about all inclusive. We have all kinds. There are more than 50 different categories of engineering listed in the AEC manpower inventory schedule.

For example, the largest single group is the chemical engineers. There are some 1,400 working in the program. We subdivide them into several classes such as ceramic, corrosion, solvent extraction, uranium compound production, separation process, etc.

The next largest group is 900 electrical engineers. Then come 800 mechanicals and about 500 of the remainder are civils. We are developing an entirely new engineering classification which may become quite important as we get closer to the possibility of producing electric power from the atom. There are reactor engineers—men skilled in the development and operation of the "engines" of the atomic age.

Q. *In that connection, we know the AEC recently has been encouraging industry to make plans for participating in the atomic program. Are all of our atomic activities now carried on by the commission or does private industry have a program of its own?*

A. First, please note that practically all atomic research, development and production is carried out by private industry and universities under AEC contracts. The Commission is held responsible—under the Atomic Energy Act of 1946—for the production, ownership and use of fissionable material. It is charged with conducting research and with exploiting scientific and engineering advances in this field for the common good. The agency owns the basic



Los Alamos Scientific Laboratory, Los Alamos, New Mexico. This is the right hand face of the Homogeneous Reactor (water boiler) showing concrete shielding which surrounds all sides except front. Lead bricks at left protect against radiation.

production plants but industrial and academic contractors operate them.

However, there are growing segments of this young industry wholly or partially in private hands. For example, there are upwards of 100 firms making all kinds of radiation detection instruments and research equipment.

Hospitals, agriculture groups and a growing number of industrial concerns are making use of radioisotopes. Prospecting for uranium bearing ores is largely in private hands. Now we have the significant proposals of four groups of chemical and power companies to study the feasibility of building and operating reactors utilizing private capital. So, gradually, we may expect more of the atomic energy business to be developed by private industry. This is in line with the basic policies of the Commission.

Q. *Is it hard to get men with the necessary background?*

A. That depends on the field and the specific program for which the engineers are being sought. Obviously, we need men with a knowledge of the fundamental fields of engineering. Their education and training should have been based upon thorough grounding in basic science and engineering with the usual specialization in some major branch of engineering.

In many cases, we need men with specialized training. We cannot always find such men who have acquired, through advanced study or industrial or laboratory experience, exceptional competence in particular fields. Atomic energy work covers a broad range of engineering and operating problems. An undergraduate course cannot prepare a man for all of these fields. But it is important that an engineer interested in the atomic program be well grounded in the fundamentals.

Q. *Isn't the ideal candidate for AEC work one who has had special scientific training?*

A. Certainly, a man who, in addition to his basic engineering courses, has had the opportunity to study nuclear phenomena and has acquired a sound foundation in the sciences is going to be most useful to the program. He should have the ability to recognize, understand and cope with nuclear engineering problems, many of which will be unique.

Take the reactor as an example—the "engine" of the atomic age. We are now building the "second generation" of these atomic furnaces and perhaps in the not too distant future, private industry may be building reactors of its own. The civil engineer must use his knowledge of buildings to design structures for remote control. He must devise ways to use special purpose concretes and unusual materials. The mechanical engineer must apply his skill to the development of remote control mechanisms and precision methods for fabricating components of reactors. The electronic expert faces new and often baffling problems in instrumentation. The metallurgical engineer works with hitherto uncommon metals in an effort to cope with radiation effects and high temperatures. The chemical expert must adapt processes to remote operation and to producing products in industrial quantities to meet standards of purity seldom attempted outside of a laboratory. So, I think you can see that sound basic training in the sciences, as well as in engineering, is apt to be most useful.

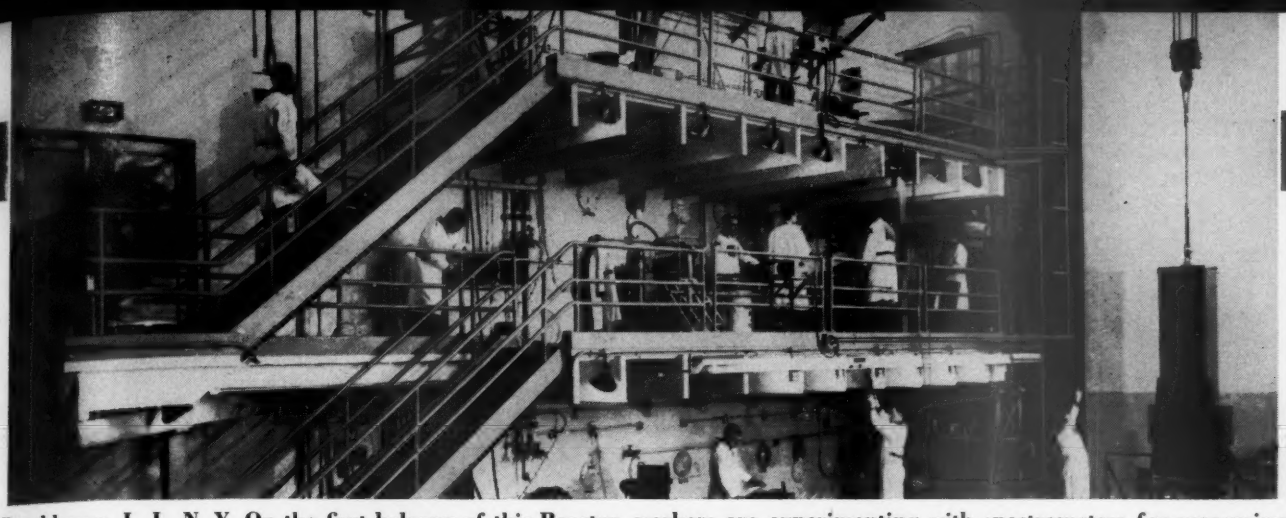
Q. *That is an interesting analysis, Dr. Glennan. What is the AEC doing to keep a steady supply of this kind of engineer coming into the atomic program? Do we need to change the curricula of engineering schools to turn out more men of this type?*

A. Let me begin the answer to that one by saying that the Atomic Energy Commission wants to stay out of the business of education as far as possible. We work closely with the American Society of Engineering Education and this mutual cooperation has developed several good ideas.

One is the summer symposium on engineering at our Oak Ridge, Tennessee installation, sponsored by the Society. This is its third year. This intensive series of lectures covers two weeks and is well attended. In addition, many faculty members of the 26 Southern schools that are members of the Oak Ridge Institute of Nuclear Studies spend the entire summer working and studying in the facilities of the Oak Ridge National Laboratory. Similar work is carried on at some of our other research centers. In this way, educators are being made increasingly aware of the needs of the Commission and of the opportunities which exist for well trained graduates.

Other ways of stimulating attention to the atomic phases of engineering education are through the research participation programs, the graduate fellowships and the radiological physics fellowship plans and the travelling lecture program.

We have also established at Oak Ridge a School of Reactor Technology. This should be a pilot operation and several universities may be equipped in the



Brookhaven, L. I., N. Y. On the first balcony of this Reactor, workers are experimenting with spectrometers for measuring the energies of neutrons in beams emerging from the Reactor.

near future to take over this training. The Consolidated University of North Carolina is going to have its own low power research reactor—the first to be built without any AEC financial support. It will be located at North Carolina State College at Raleigh. We believe these programs are taking care, in a preliminary way, of the curricula problem. Of course, we welcome any further ideas where our interest and the information we can make available will be useful to engineering colleges.

Q. *When you mention information, you bring up an important point. Some engineers and students complain that AEC security measures are too rigid and that it is hard to get information on atomic energy.*

A. I do not believe the security limitation on information is as great as is commonly believed. There are a wealth of data available—data that either have never been secret or have been declassified. The process of declassification is continuous. Only last spring, in cooperation with our wartime partners in the development of atomic energy—Great Britain and Canada—a large area of basic reactor information was brought into the open after careful weighing of the advantages to the progress of our own program against any possible assistance such action might give to our enemies.

It is true that the matter of security makes it difficult for engineers and students to get information on actual current engineering problems of atomic energy. The Atomic Energy Act places the direct charge on the AEC to develop knowledge and uses of this great new force and to disseminate scientific and technical information—but with this overriding limitation, and I quote: "subject at all times to the paramount objective of assuring the common defense and security." The actions—rather than the words—of the men in Moscow force us to be extremely careful about the release of scientific and technical data.

Despite this unwelcome condition, I believe the actual secrecy involved may be exaggerated. For example, there is ample literature on nuclear reactors. I might mention the two-volume work edited by Clark Goodman, SCIENCE AND ENGINEERING OF NUCLEAR POWER; and ELEMENTARY PILE THEORY, edited by Harvey Svodak and Edward Campbell. The AEC assists in the publication of specialized books such as the highly useful SOURCE-BOOK ON ATOMIC ENERGY by Samuel Glasstone; the Aerosols Handbook and the Liquid Metals Handbook. These have a direct bearing on atomic program engineering. I have an idea that some people in the field of engineering education are not aware of the wealth of information that is now available. And once again, let me stress the importance of providing for the student in engineering thorough grounding in the fundamentals of science and engineering.

Q. *Let's go back to the student. What can you tell him about the opportunities for careers in this new atomic energy industry. For example, how many jobs are available to this year's engineering graduates?*

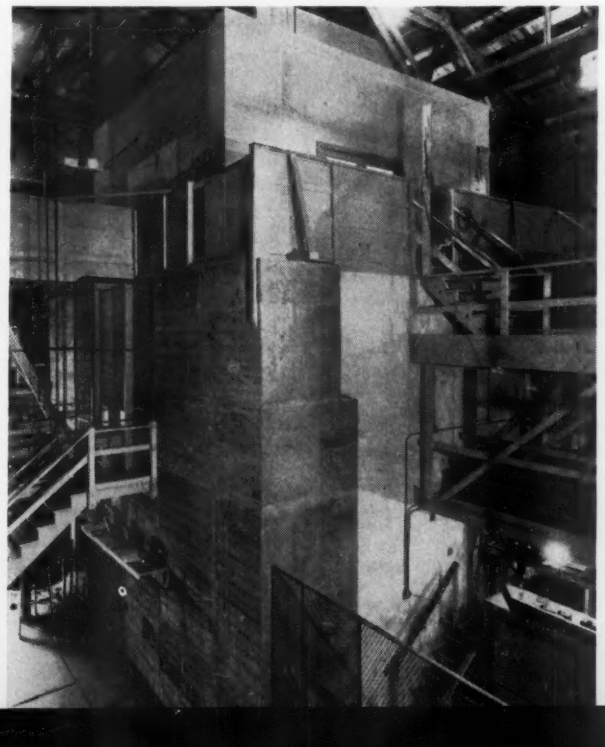
A. I cannot give specific figures. Our contractors sometimes recruit without requesting assistance from the AEC. Our own personnel people may not have a single request on a given day and the next week may have a frantic appeal for a half-dozen young engineers.

The cardinal fact is that this is a growing industry and that it takes a lot of engineers to run it. Therefore, it does offer many opportunities for interesting and useful careers. I am told that our contractor at the huge Savannah River Plant—the du Pont Company—is going to need upwards of 800 technical people by 1953. It seems safe to assume that many of these will be engineers and that some young graduates will be employed.

Another AEC contractor, the General Electric Company which runs the huge plutonium factory at Hanford, Washington, has an-

(Continued on page 41)

This reactor was originally constructed under the stands of the U. of Chicago's Stagg Field, and was first used in December, 1942. The reactor core is a huge cube of graphite in which 52 tons of uranium and uranium oxide have been embedded in the lattice-type arrangement.



strength and security with

Air Power

Maj. de Seversky

By Major Alexander P. de Seversky,

Noted Aircraft Authority, and member, N.S.P.E.

OUR country is in great peril — not because we face a formidable enemy, but because there is great confusion in Washington as to the ways and means by which our country can defend itself.

On the question of national aims we are unified. We are for freedom and the dignity of Man. We are willing to fight and die for that freedom, and to help all the people of the earth who stand for the same principles.

We are also united in the conviction that America must be invincibly strong, because diplomacy is failing, and once again raw force is on the loose.

But the decision to be strong is only the beginning of wisdom, it is not the end. Which kind of strength? How can we utilize (and we as Professional Engineers, many in industry, should be vitally concerned with this) our limited resources and manpower in a way that will make us stronger than a potential enemy who exceeds us in both? On that subject there is no unity in our Administration, in our Congress or in the Pentagon. Our people are being kept in ignorance and confusion.

To illustrate the public confusion that exists in the sphere of national security, let us examine the recent statements made by five outstanding public figures whose patriotism is beyond question, whose experience in political affairs is broad, and who undoubtedly have direct access to top military thinking.

Let us start with Governor Dewey, who places his entire reliance primarily on ground forces. He wants us to raise a hundred divisions which will have to be spread all over the face of the earth, ready to engage the enemy in primitive hand-to-hand combat, wherever and whenever the enemy strikes. To my mind, for America it spells disaster and defeat on the battlefield to fight in primitive hand-to-hand combat, Korean style, all over the world. It means trying to retrace the steps of Napoleon and Hitler, facing, perhaps, one thousand divisions. We will never be able to match the teeming hordes of Asia on the ground.

Former President Hoover says, "No, we can never match the enemy in ground warfare; let us channel our national effort into powerful naval and air force, and preserve for the world this Western Hemisphere as a Gibraltar of western civilization." This is the most advanced concept so far offered, except that the need for a powerful navy is unduly emphasized. Today navies can operate only under friendly skies guaranteed by air force and, conversely, the nation which achieves global command of the air does not need a powerful navy. It should be evident, therefore, that excessive investment in naval force at the expense of air force is self-defeating.

Then comes Senator Taft. He proposes to surround the enemy with a chain of island bases supported by sea power, and recommends an air offensive from those bases. But that would merely enable Russia to concentrate its total air strength against one base at a time and thus neutralize them. The only way to defend them would be to endow each base with strength capable of dealing with the entire air might of Russia. Obviously, it will take a painfully large portion of our national effort to create air power capable of defending our own nation against enemy air attacks. How can we possibly have scores of bases, each one possessing an air potential sufficient to enable it to ward off the entire weight of the continental Russian air force? It simply is not within our industrial capacity to support that kind of offensive.

John Foster Dulles has still a different plan. He wants to surround Russia with bases strung along the 20,000-mile periphery of the Eurasian continent. That may guarantee us defeat in the Japanese style. Japan was defeated through its misguided belief that war could be kept away from home. It planted its military potential on a string of bases a thousand miles from home. That gave us an opportunity to destroy its potential piece-meal, atoll by atoll, and finally, when we came to the Japanese home islands, they had nothing left with which to defend their homeland. By following Mr. Dulles' recommendation and spreading our potential strength all over the Eurasian continent, we again would be offering our strength to the enemy in tempting tidbits, for easy swallowing.

FINALLY we come to our present official strategy, backed by President Truman and pompously tagged "the Strategy of Balanced Forces." Actually, this is no strategy at all. It contemplates building anything and everything that comes to mind, the biggest Army, the biggest Navy, the biggest Air Force, the biggest Marine Corps, the biggest Coast Guard—and at the same time rearming the world, as well as feeding the world and giving technological help to all the backward nations. All of this would be a very fine trick if we could do it. That is what I call a Sears-Roebuck approach to our national defense—trying to build all sorts of weapons and forces to meet all conceivable sorts of conditions that may be contemplated by the enemy. The initiative will be left entirely to the other side. It means that most of the assorted weapons and forces will lie idle. It means ultimately defeat from exhaustion and economic collapse.

If we go through with such a wasteful and lavish strategy, building indiscriminately in every direction, I am afraid we will have to be regimented to put it into effect, and in the process I feel we may lose the very liberties we are trying to protect.

Now, how could five prominent public figures such as these, be so far apart? The answer is in the fact that these five men were supplied with five different sets of military ideas, coming from all five sides of the Pentagon.

The confusion and the contradictions are due to the complete ineptitude of current top-level military thinking. Our top military men have fallen into the fatal historical error of trying to fight the next war with the methods of the last.

We have seen this happen twice already in our time. France won World War I in the trenches, so, preparing for World War II, she built a bigger and better trench, the Maginot Line. She took full advantage of interim technological progress, so it turned out to be a marvellous trench, a trench de luxe. But the basic strategic assumption was still the same—that the next conflict would be just as static as the previous one. France was tragically wrong. World War II proved highly dynamic. The inert Maginot Line was completely ignored. The country's entire national effort was wasted, and France went down in defeat.

America committed a similar error. In preparing for the last war in the Pacific, we relied on sea power, based on battleships. We prepared for a traditional Nelsonian sea battle with the Japanese Navy. It was our fond belief that after sending the Japanese Navy to the bottom, we could polish off the war in a matter of weeks.

But it was *our* fleet that was sent to the bottom at Pearl Harbor—and by enemy *air* power. We were expelled from the Pacific by the enemy's novel "balanced task forces." We survived as a nation only because the enemy's air power could not yet reach the heart of our industrial complex. We had the time and the prodigious industrial capacity—for which the engineering profession can be thanked—to build bigger and better balanced task forces, and by imitating the enemy to beat him at his own game.

We tend to forget our panic immediately after Pearl Harbor. We were face to face with defeat and disaster. The reason? Because in preparing for World War II our thinking was stuck in the mire of World War I strategy. The fact that our bombers were kept at the bottom of the priority list for more than two years after the outbreak of war in Europe and even for several months after Pearl Harbor, is sufficient to indicate that military thinking was in a deep-freeze. Today we are facing the same sort of calamity, and for the same reason and under leadership, for the most part, of the same men. We are preparing for a possible World War III, with our military thinking stuck in the mire of World War II strategy.

We won the last war with triphibious balanced task

The B-18A. First major jump to huge metal bombers.

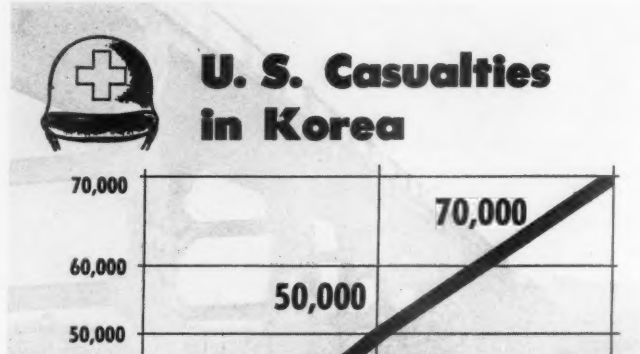
Boeing B-17, the famous work-horse of World War II.

The B-29, above, was a big step in strategic bombing development. Below, the latest B-47A Stratojet, has a top speed of 600 miles an hour.

forces; therefore, we are now taking advantage of interim technological progress to build bigger and better balanced task forces. Our assault barges are being replaced by super-barges, our battleships by new guided-missile battleships. Tanks have become super-tanks, and aircraft carriers, super-carriers—floating islands at a billion dollars a throw. But the underlying idea of approaching the enemy from base to base is unchanged.

I am convinced that our task forces, like the Maginot Line, will be *ignored!* Enemy long-range air power will bypass them, and will attack America's industrial power right here at home. The global range and destructive power of planes now in the skies, both here and in the USSR, make it an absolute certainty that in any major conflict our own industrial heartland, our cities, our homes and our children, will be under immediate bombardment. The preponderance of casualties will be right here at home.

THIS is a horrifying prospect, but it is bound to become a reality unless we drastically revise our strategic concepts in accordance with new conditions:



First: In the last war overwhelming manpower was on our side. Russia and China, with their teeming millions, were our allies. We were able to muster a billion people. Today that billion is against us.

Second: In the last war, Germany and Japan had limited natural resources. They depended on strategic materials that had to be brought from across the seas. Today the Eurasian continent, with its vast resources, is self-contained, needing nothing from overseas.

Third: In the last war, the airplane had limited range and limited destructive power. Before being in position to strike at the enemy's industrial heart, it had to be carried piggy-back by Armies and Navies to bases within its striking reach. Today the airplane has global range. It does not depend on Armies or Navies. It can strike with the full fury of the atom bomb at any spot on the globe, be it an enemy base, a naval convoy, a source of strategic material, or a vital industry—and return to its home base.

Fourth: In the last war, because of the short range of aircraft, it was possible to maintain overseas bases on a hostile continent and its adjacent islands. That no longer can be done. The enemy air force can direct its entire striking power against one base at a time and neutralize it. As I have already pointed out, one does not have to be a military expert to realize that it would be beyond the realm of possibility to endow each base with air defenses capable of warding off the entire air power of the enemy continent.

Fifth: In the last war, because of the short range of aircraft, our shipping was practically unmolested, except by enemy submarines. Today our ships can be attacked by the enemy's land-based air power anywhere on the seven seas.

From these new conditions, two things are clear. We can never defeat the enemy in ground warfare; and our command of the sea, even without enemy interference, would be no threat whatever to the self-contained Eurasian continent. And if these two premises are correct, then our tactical (short range) air power which supports the Army and Navy is also irrelevant.

So we are left with only one road to victory—Strategic (long range) Air Power that can rise directly from our shores, from bases inaccessible to the enemy's land might and its tactical air force, and can disarm the enemy by destroying his industrial means of waging war.

Today we do not have such a striking force. Our present Strategic Air Force is well equipped, well manned and superbly led—but it is only a token force. Should we attack Russia today with our skeleton Strategic Air Force we would sacrifice this precious nucleus, squander our atomic bombs by inflicting only indecisive damage and then, like the Japanese after Pearl Harbor and the battle of Midway, we would have nothing left with which to follow up to a decision. Today we simply do not have Strategic Air Force of sufficient size even to impair the Russian war effort, let alone destroy it—and we will *never* have an adequate Strategic Air Force as long as we persist in dividing our national potential three ways—among Army, Navy and Air Force. Yet that is exactly what the "Balanced Forces" strategy is compelling us to do.

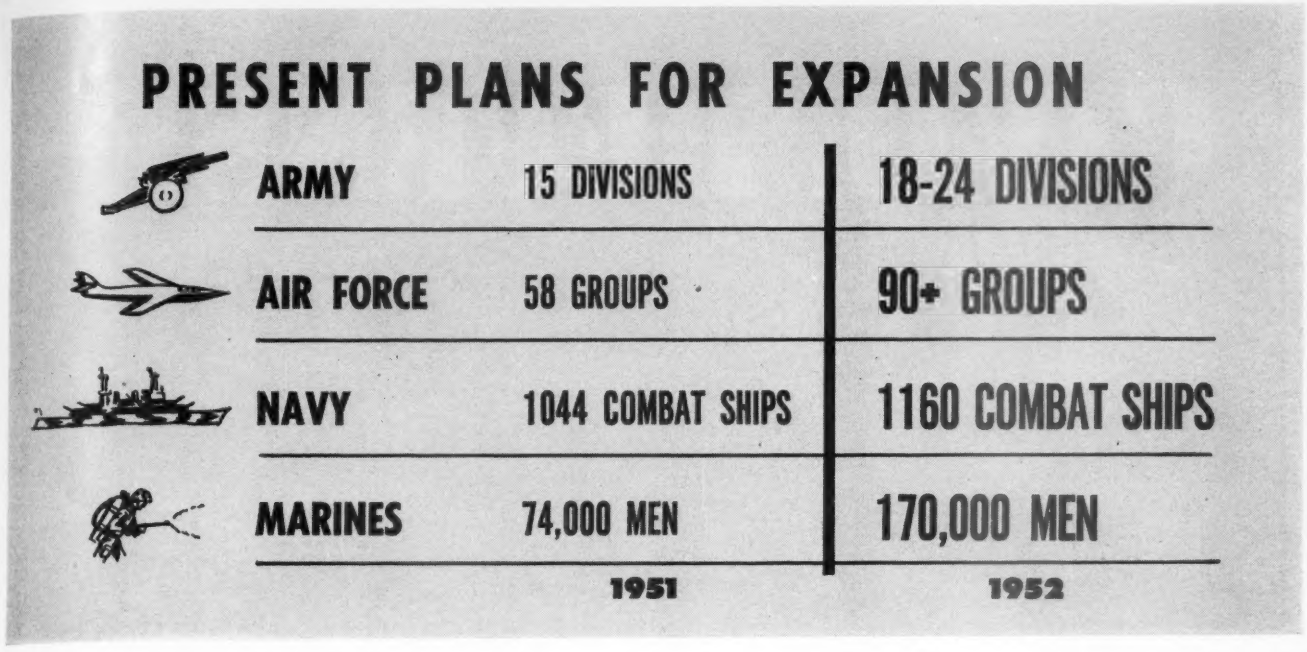
We cannot possibly defeat the vast Russian Army with an American Army built with only one-third of our national potential. We cannot subdue a self-contained Eurasian continent with our Naval Force, which absorbs another third of our national potential. And finally, we can never defeat the Russian air force and take command of the air over the Eurasian continent if only one-third of our national potential goes into air power.

These three negatives, combined into the balanced forces strategy, do not make a positive. They simply render it impossible for us to achieve dominance in any one decisive medium.

The balanced team is only as good as its weakest member, and in relation to the limitless Eurasian manpower our ground member of the team will always be at a disadvantage.

Korea has proven that. On that little peninsula, in spite of unopposed use of air force as additional fire power for our ground force—and at the cost of 300,000 U. N. casualties—so far we have been able to achieve only a stalemate.

No matter how it is explained, a stalemate in Korea amounts to a victory for the Kremlin. Communist strategy aims to disperse American manpower all over the earth, and weaken the American economy in the process. Korea



is the first installment on that strategy.

I for one do not believe that Moscow was taken unawares by our decision to fight in Korea, or that Malik's absence from the Security Council of the U. N. on the day of that decision was a Soviet "blunder." It was all part of the larger Soviet design. Mistaken diplomacy had put us in an untenable position in Korea. Moscow took advantage of this, leaving us no choice, short of a final showdown, but to lose face or fall on our face. We chose the latter.

Even if we are eventually successful in Korea, before the story is told we may have as many as 500,00 men committed in Korea merely to stabilize the impasse; perhaps another million and larger air contingents will have to be held in reserve in Japan. And all these forces will have to be supplied and maintained in combat readiness by a great naval armada at a cost of billions of dollars. Meanwhile, the Kremlin, by tying up a portion of our strength in Korea, at the end of a 5,000-mile limb, will to that extent have improved its own relative military position.

The enemy has channeled his resources primarily into land power, and achieved preponderance of force in that medium. It stands to reason, therefore, that the balanced-team approach will always deteriorate into ground warfare. And if the position of our armies becomes desperate, the entire air power of the nation, including the long-range Strategic Air Force will be thrown into this battle by terrestrial-minded leadership. It will be used up for ground support with nothing left to achieve command of the air.

This is exactly what happened to the German Luftwaffe. During the interrogation of Marshal Goering I asked him why he did not rebuild his bombing fleet for strategic action against the British Isles. He said he did but, and I quote: "My beautiful bombing fleet was used up by Hitler as air transport cargo planes carrying boots, mittens and blankets to the Volga River to save his armies at Stalingrad."

General MacArthur said, and I quote, "No man in his right mind would advocate sending our ground forces into continental China." In other words, he considers, and rightly so, such an undertaking as preposterous and beyond our ability to sustain. Yet what is the Korean peninsula if not a part of the same land-mass, the same continent as China, defended by the same armies?

Suppose some foreign General Staff declared that no man in his right mind would advocate sending his ground troops to the continent of the United States and then proceeded with a land invasion of Florida. Would we not suggest that their heads should be examined? Yet Korea is the Florida of the continent of China. MacArthur is correct—no man in his right mind should have sent our ground troops into Korea. Our plight in Korea is the result of the violation of this basic strategic premise and nothing can alter this melancholy fact.

Recently rumors have emanated from the Pentagon to the effect that the overwhelming manpower advantage of the Communists would be taken care of by the use of new and miraculous weapons. But this I consider disturbing. Because when military men begin to brandish wonder weapons it is usually a sign of their strategic frustration. After Germany's strategic position deteriorated in the last war, she pinned her hopes primarily on wonder weapons with a result that is history. Facing an allied air offensive of overwhelming numbers, Hitler promised to meet the threat with jet and rocket fighter planes, guided missiles, buzz bombs and finally V-2 rockets. But our conventional aircraft—though ten years old in design—swamped his much-advertised weapon novelties.

We were able to do this because our strategy was right. The use of our Air Force in a strategic role was correct and we were able to muster the right force at the right time. Technological superiority as created by our engineers, is of course a great advantage—but it can be decisive only when it implements a correct strategy. It must prove futile and a delusion if the fundamental strategy is wrong.

If our military leaders count on extricating us from untenable positions in future conflicts by the use of weapon novelties, our country is headed for trouble. And I don't care whether these novelties are atomic bombs, atomic dust, atomic shells, atomic bullets or atomic B-B shots—or some novel land-mine that will bore its way, automatically, through the ground like a mole. It may surprise

(*Continued on page* 38)

CIVIL DEFENSE—

Its Big Need Is Engineers

By

MILLARD CALDWELL,
Administrator, Federal Civil Defense Agency

PERRY T. FORD, P.E.,
Director, Engineering Services Division, Technical Services Division, FCDA

LLOYD A. BLANCHARD,
Director, Rescue Service Division, FCDA

VINCENT B. LAMOUREUX,
Environmental Sanitation Consultant, Health and Special Weapons Defense Division, FCDA

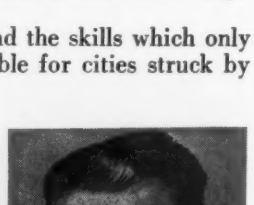
Introduction

By Millard Caldwell

Administrator, Federal Civil Defense Agency

THIS national defense issue of the AMERICAN ENGINEER points up sharply the fact that the civil defense program must have the cooperation of the entire engineering profession.

Without America's engineers and the skills which only they possess, it would be impossible for cities struck by atomic bombs to get up off the floor and fight back. Engineering skill is needed in so many civil defense services that it is difficult to enumerate them. They include restoration of utilities, sanitation, rescue operations, debris clearance, and many others.



Mr. Caldwell

I hope every engineer will read the following articles by our officials, and apply the contents in terms of his own personal contribution to civil defense. Our thanks are due a great many engineers who have contributed their services to the planning and organization of American civil defense. With their aid, we have developed a sound plan for the civil defense engineering services. Now the engineers are needed to operate those services as a part of our national program for protection of the home front.

Engineering Services In Civil Defense

By Perry T. Ford, P.E.,

Director, Engineering Services Division, Technical Services Division, FCDA

IT does not require an expert in military affairs to be able to appreciate that the arts of warfare have undergone revolutionary changes in the past fifty years. No longer are wars a matter of, shall we say personal conflict; that is, duels between opposing forces of man and ships. Warfare today is carried on not alone on what formerly was referred to as a "battle field." War is now waged over unlimited areas with types of weapons and in a manner which strikes at combatants and noncombatants alike.

A realization of this situation is what has made it necessary to bring into being an agency such as the Federal Civil Defense Administration, created for the purpose of so organizing our civilian population, our noncombatants, so that they, along with our armed forces will be able to meet an enemy attack in whatever form it may come. Our soldiers, sailors and marines are prepared to meet an enemy, so must we civilians be prepared to meet an enemy attack. And this we propose to do by marshalling all our civilian resources in self-defense.

To list our resources from the moral and spiritual right down to the material and natural would cover a vast territory. Let us here consider just one of our resources and see just how best it might be utilized in order to make the greatest possible contribution to our self-defense, our civil defense effort. That one resource is the *Technological Manpower* along with its equipment, its tools and its materials. This reservoir of Engineers, Architects, Technicians, Chemists and Scientists will constitute the greatest possible factor in the program, if all are active and alert to the necessity of focusing our talents and efforts on a common objective.

We must each take an inventory of our position in the preparedness program and determine if it is adequate to meet the challenge if and when it comes. If the inventory reveals inadequacies, incompleteness, or unpreparedness then our sights should be readjusted and our efforts rededicated to bring them into proper focus. The simple task of doing the job has compensation and value far beyond our hopes and calculations. The sense of comfort and reassurance that comes from knowing we are joining forces and contributing to the resources of our great country in a common and vital cause is worth more than all the money it will cost.

An enemy attack on any American city would create emergency problems of a magnitude never before experienced by our people. Communications, power and water supply and other essential services would be disrupted.

Tons of debris would fill streets and highways. Partially demolished structures would present safety hazards, and the number of casualties would be enormous. Thus, it will readily be realized that under these disaster conditions which would be created, the necessity for the services of engineers is of primary importance.

Such an attack would presumably be aimed at the great metropolitan areas, at the country's most critical targets, the places where industrial establishments are located. But such an attack would be against ALL the people of the United States, and therefore, defense against it will require the coordinated effort of the entire Nation.

It is expected that such an attack would be partially successful. Whether it would succeed in destroying our productive power would deepnd in large measure on the organization and functional efficiency of the Country's *Civil Defense*. And, as has been stated, the role of the engineer in this *Civil Defense*, this defense of our people, our homes, our way of life, is one of tremendous importance.

We should not confine our thoughts solely to "Atomic Attack." Other destructive means such as reside in the use of biological and chemical agents, in sabotage and other subversive activities will demand our best thinking and planning.

The mere realization of this fact is, in and of itself, meaningless, unless we as engineers actively participate in the work of organizing and equipping and operating all of our resources in order to bring them to bear on the problems at hand. Let us therefore explore the areas in which we should organize to operate and give point to our discussion by considering some specific cases which will demand an exercise of our talents, our efforts, and our combined experiences. This we can best do by trying to visualize the circumstances and conditions under which we will be called upon to work during the immediate post-attack period, the disaster period, and even perhaps the period when panic will be rife.

IN normal times there would be no need to take extreme measures to repair a broken water main or connection. In like manner, a break in an electric power line would be promptly remedied. In fact all of the various public and private community services; gas, telephone, transportation, etc. are ready and able to cope with any accidental or incidental disruption. The individual citizen takes this situation for granted. He knows that repair and restoration facilities are as handily available as his telephone.

But let us look at the situation that is likely to confront us in the event of an enemy attack. It would not be a matter of ONE service being disrupted. It would be a matter of innumerable cases arising over a considerable area, an area into which it may be difficult if not impossible to move because of damaged or blocked roads.

It is in anticipation of the creation of conditions such as are indicated in the preceding paragraph that the Federal Civil Defense Administration has created an *Engineering Services* and, in conformity with the declaration of policies as stated in Public Law 920 which established the FCDA, charged it, along with the other Offices and Services, for providing necessary coordination and guidance in addition to providing material assistance within the limitations of the Act.

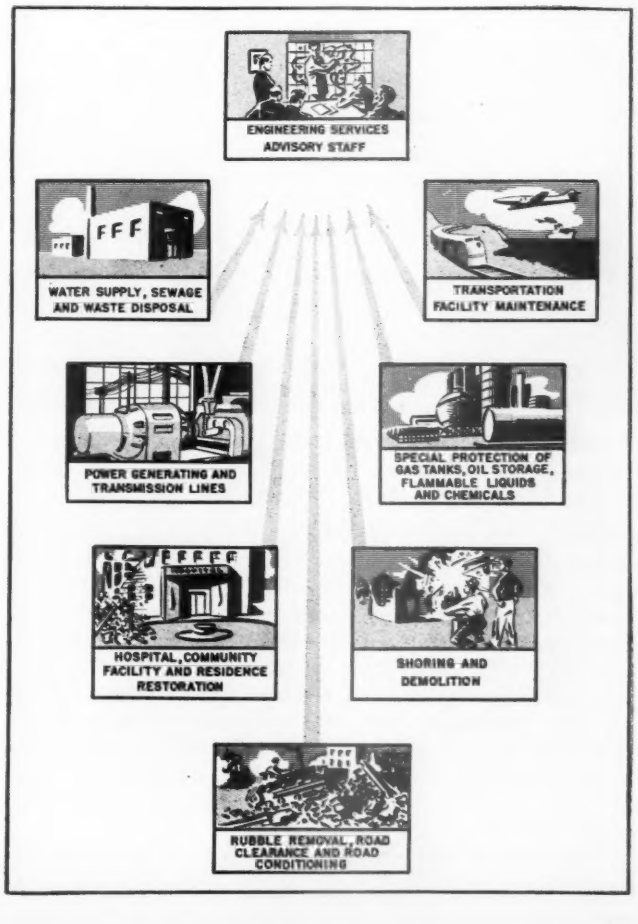
In simplest terms, our job then is to provide coordination and guidance in organizing, training and equipping an engineering civil defense force to minimize the effects of an enemy attack.

As a first step in coordination and guidance the Engineering Services asks States, Counties, and Cities to designate a Chief of Engineering Services. In addition it suggests that the Chief of Engineering Services create an advisory council to be made up of civic minded, experienced engineers, architects, contractors and similar persons.

The next, an extremely important step, is that of setting up a plan according to which all of our resources will be mobilized and brought into action. The plan should be based on the best thinking that our Chief of Engineering Services, assisted by an Advisory Council, can bring to bear on the numerous problems that undoubtedly will arise in the immediate post-attack period. The degree to which we can practically visualize and prepare for every eventuality will determine the effectiveness of our planning and our performance if and when it should become necessary to put them into action.

The Engineering Services are fortunate in having existing organizations to draw upon for men, material, and equipment. Our plans should make provisions for their enlistment, training and assignment. The training does not contemplate instruction in the normal work of our groups. The training will merely embrace actual practice in cooperative action. In other words, immediately after an attack a public water department, in accordance with its preassigned mission, would shut off broken mains and start repairing damaged facilities. After a survey of the damage, it would requisition additional supplies needed and obtain delivery of those items on a pre-established priority basis. At the same time, it would call on the local civil defense engineering services for help in the form of contractors' crews or material. If necessary, teams from the water department of neighboring towns might be summoned to assist. And this same procedure would apply to our gas company, our electric power company, our Department of Sanitation, or Highway Department. We do not want to disturb the existing plans and procedures of our established utilities and industries; rather do we want to emulate

Chart of Engineering Responsibility


ENGINEERING SERVICES ADVISORY STAFF
WATER SUPPLY, SEWAGE AND WASTE DISPOSAL
TRANSPORTATION FACILITY MAINTENANCE
POWER GENERATING AND TRANSMISSION LINES
SPECIAL PROTECTION OF GAS TANKS, OIL STORAGE, FLAMMABLE LIQUIDS AND CHEMICALS
HOSPITAL, COMMUNITY FACILITY AND RESIDENCE RESTORATION
SHORING AND DEMOLITION
RUBBLE REMOVAL, ROAD CLEARANCE AND ROAD CONDITIONING

them when we set up the procedures for dove-tailing all of them into *one* homogeneous whole in the interest of a common cause. And let us not overlook such other areas as those which involve our ports and shipping facilities, our airports, our railroads and our local transportation system.

THUS it will be seen that in order that each organization and group be fully informed of its place in the Civil Defense picture, much planning must be done. Where shall the various crews and groups assemble; who is to direct them to the scene of operations; these and many, many other problems can only be met if we, as engineers, follow our well established, tested procedures and wisely PLAN to make the most efficient use of our knowledge, our experience, and our foresight. That we as engineers have given thought to this matter is evidenced by the numerous articles which have appeared in various technical and trade publications.

Our plans should contemplate an inventory of both public and private equipment ranging from picks and shovels to giant cranes. Our plans should take into consideration the number of individuals available for manning our activities. Our plans should make provision for alerting our operating personnel any hour of the day or night, assembling them at predetermined points, and moving them to the site of action.

We must be prepared to carry on during the heat of summer or freezing weather. And we must plan to immediately undertake precautionary measures. Properly implemented, these measures can contribute much that will reduce the damage that is likely to be done to our cities, our industries, our homes, and our people. An Engineering Services Administrative Guide is now nearing completion and will be followed by a series of Technical Manuals which will aid in the proper conduct of all phases of the various undertakings of the Engineering Services.

We on the national level are free to express and frank to admit that, as of this date, we are far from our goal as to what all think is an adequate solution to problems confronting each and every American.

The stressed and strained condition of world affairs may bring a catastrophe any day or week that may test, to the limit, our capacity to survive in a free world. Knowing this, it behooves us, as Engineers, to be ready to meet the challenge. Our fore-thought and planning are badly needed.

The engineer, by virtue of his training and experience, is in the habit of bringing order out of chaos. Since we are living in an "Engineering Age" much is expected of him. We can fail only if we neglect to keep ourselves alert and organized to meet any emergencies that may come from forces of Nature, Sabotage or Hostilities. Let us be ready. Let "planning" be our watch word.

If our planning is wisely done and practically implemented the Engineering Services will be able to fulfill its function.

Sanitary Engineering In Civil Defense

By VINCENT B. LAMOUREUX,
Environmental Sanitation Consultant, Health and Special Weapons Defense Division, FCDA

SANITARY engineering, as considered here, applies only to that part of engineering knowledge and operations which, in turn, is a major part of the public health program within the country today. As defined, this field of engineering, its planning and its operations, is administered within the Health and Special Weapons Defense Division of the Federal Civil Defense Administration and will be similarly administered within the civil defense health services of State, sectional or local civil defense organizations. Sanitary, or public health, engineering in peacetime is concerned with the sanitation of the human environment with safe water supplies, adequate liquid waste disposal, milk and food sanitation, refuse collection and disposal, rodent and insect control, hygiene of housing, and all other activities which are a part of housekeeping of modern cities and other political subdivisions. During any emergency created by threat of war, planning must be accomplished to provide adequate operations during and following enemy attack because all of the duties indicated above, and more, must be faced when disaster strikes. Further, the sanitary engineer will find it necessary to do more of the tasks in which he is normally engaged in less time than he needs or has at his disposal.

In order, the sanitary engineer must know that safe

Training now (left and right above) is the only thing that can save lives when such disasters as the Hiroshima bombing (center) strikes.

water supplies have been provided, that adequate, sanitary shelter for evacuees has been secured, and that safe food and milk will continue to flow into the stricken community and to necessary mass feeding centers. The storage and handling of foods and milk under emergency conditions will of themselves constitute major problems in sanitation. Radiological defense, particularly monitoring and decontamination, are duties, added because of a war disaster emergency, which will require the attention of the sanitary engineer. Gas warfare, with its attendent problems of contamination and decontamination, adds to the wartime burdens imposed on the sanitary engineer. These and other speeded-up duties require a careful study of program, adequate pre-disaster planning, and particularly a careful evaluation of personnel, equipment and material needs in order to meet the demands of a wartime disaster and maintain the health of the populace in a disaster area so that water-borne, food-borne, and other infections resulting from poor environment will not add to the burdens imposed upon the physicians, nurses and medical facilities by the casualties resulting from an enemy attack.

The provision of water supplies in event of a war disaster is the responsibility of services other than that of civil defense health services. The first need for water will be for caring for casualties and for fighting fires. In any case, however, the sanitary engineer must be informed of damage to the public water supply at any point and be prepared to provide such advice and assistance as may be required in order to prevent the consumption of contaminated water by the survivors. Planning must provide for adequate disinfection in case of breaks in water mains and service, for shutting off such portions of the water system used to carry non-potable water for fire-fighting in order to prevent its use by the population for domestic services and the contamination of the remainder of the system by these waters.

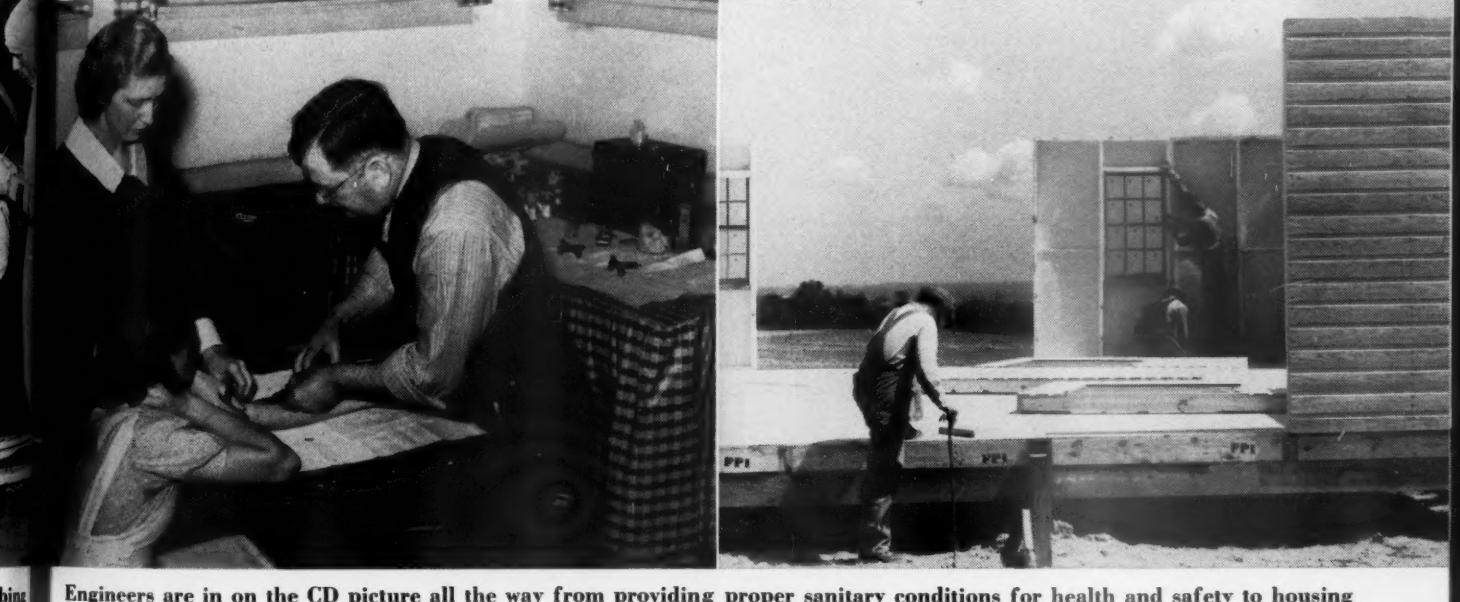
Contamination from back-siphonage from toilet and similar fixtures is probable whenever water pressures are reduced or are lacking. Auxiliary supplies for fire-fighting must be noted and protected so that the public may not have access to those supplies unfit for human uses. Other auxiliary supplies may be required to fulfill immediate needs of people temporarily without service from the public supply. In this connection, pre-disaster planning should make provision for an inventory of resources, including private water supplies suitable for use after appropriate measures to secure their safety for human use have been undertaken. Predisaster planning should provide an inventory of requirements, including disinfecting equipment, mobile water purification units, water and other suitable tank trucks and cars, chemicals, testing kits, emergency laboratory service and trained personnel.

Further, planning must provide for water supplies of safe quality for emergency medical services, for mass-feeding centers, for air-raid shelters, and for evacuation centers and temporary housing. Much of this planning may be done by other civil defense services but the responsibility for securing safety for human use of all these temporary supplies and methods of providing water must rest with the sanitary engineer.

Shelter for evacuees is another important task facing civil defense organizations. Following an atomic attack there may be expected thousands of living and dead casualties. At the same time there will be rendered homeless as many thousands of persons evacuated because of blast damage to their homes, because of resultant fires, or because contamination of living areas and quarters makes it necessary to evacuate them to safer living areas. While shelter for evacuees is the responsibility of other civil defense services, their provision calls for planning on the part of the sanitary engineer serving as advisor to the other services regarding adequacy, water supply, sewage or excreta disposal, refuse disposal, mass feeding with attendant problems of food storage, preparation, serving and cleanup, laundry facilities where occupancy will be necessary for more than a few days, and bathing facilities.

Planning should survey existing buildings and facilities suitable for various stages of a shelter program from collection points to semi-permanent housing for those whose homes have been completely destroyed. Minimum standards to guide other services must be set, again depending upon length of occupancy. Decontamination facilities for people and for clothing may be required following gas attack and some types of atomic attacks. Training of sanitarians for special supervisory duties and of volunteers for

(*Continued on page* 42)



Engineers are in on the CD picture all the way from providing proper sanitary conditions for health and safety to housing for the needy.

BATTERY LOCATION-INSIDE

◀ Preparing for a flight test of the Martin XB-51, the U. S. Air Force flight test crew (right) gets some information from Martin representatives. The flight tests were successfully completed.

MARTIN PLANS FOR PEACE OR WAR

By Barbara Haislip,
Staff Writer

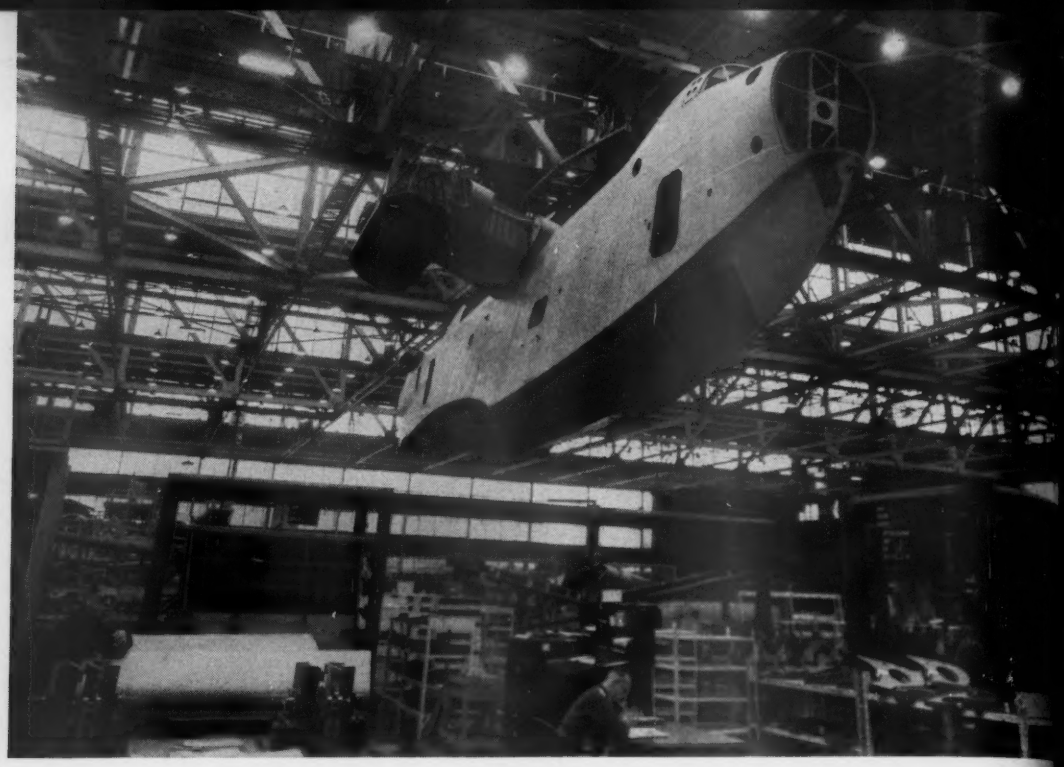
THE Glenn L. Martin Company, located in the green countryside near Baltimore, Maryland, is beginning to hum with the activity which marked it as one of the foremost Eastern airplane manufacturing firms during World War II.

Since the outbreak of the Korean War, the Martin Company has joined much of America's industry by broadening its future production base. This has been accomplished primarily by increasing the rate of tooling to prepare for manufacturing on an all-out emergency scale if necessary.

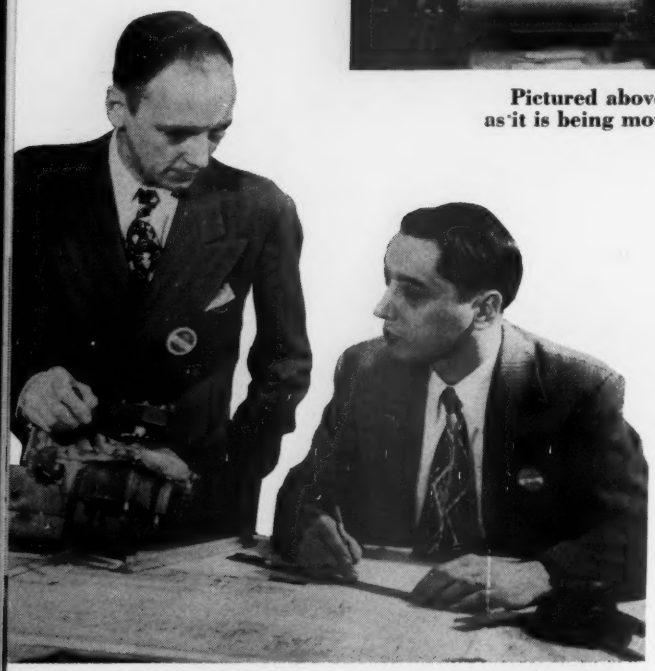
Even before Pearl Harbor, the Martin Company had a five-year plan for production, based on the number of contracts on hand and the potential manufactures required. Its present five-year plan, now blanketed by security regulations, provides for the Martin Company's conversion to full production of additional as well as

Conferences such as the one above between Martin procurement officials and a vendor's representative are an important step in production.

Stepped-up employment is also essential to increased production. Martin is now hiring several hundred people a week. Shown below is one section of the reception room of the Employment Office at the Glenn L. Martin Company in Baltimore.



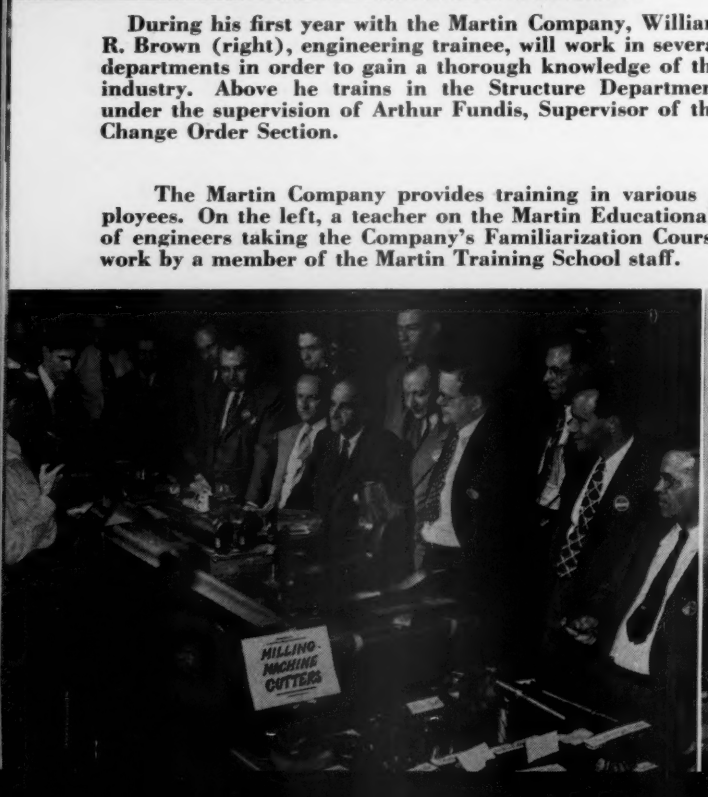
Pictured above is one of the first P5M-1 Marlin flying boats, built for the U. S. Navy, as it is being moved into a more advanced assembly position.



During his first year with the Martin Company, William R. Brown (right), engineering trainee, will work in several departments in order to gain a thorough knowledge of the industry. Above he trains in the Structure Department under the supervision of Arthur Fundis, Supervisor of the Change Order Section.

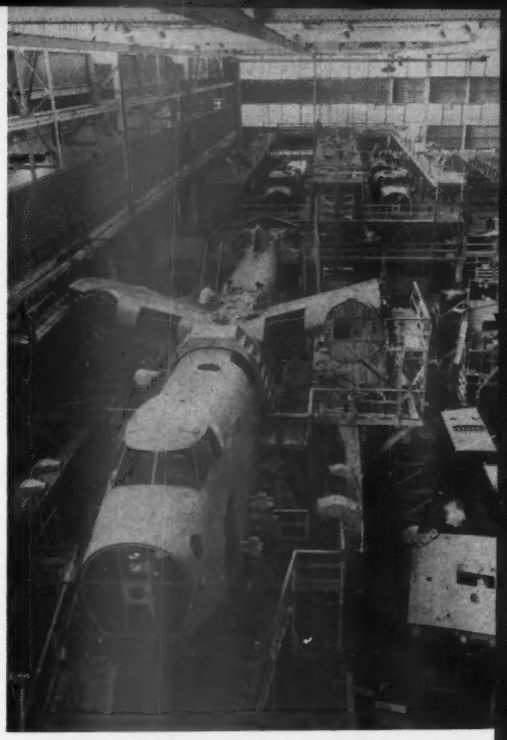
Back in his home department of Production Design, where he works from time to time throughout the year, Brown develops his special field. He will be permanently assigned to this engineering department after he has completed his assignments in the various other sections.

The Martin Company provides training in various phases of production for both its professional and technical employees. On the left, a teacher on the Martin Educational Staff is shown explaining milling cutters and their use to a group of engineers taking the Company's Familiarization Course. At right, inexperienced Martin employees are given classroom work by a member of the Martin Training School staff.

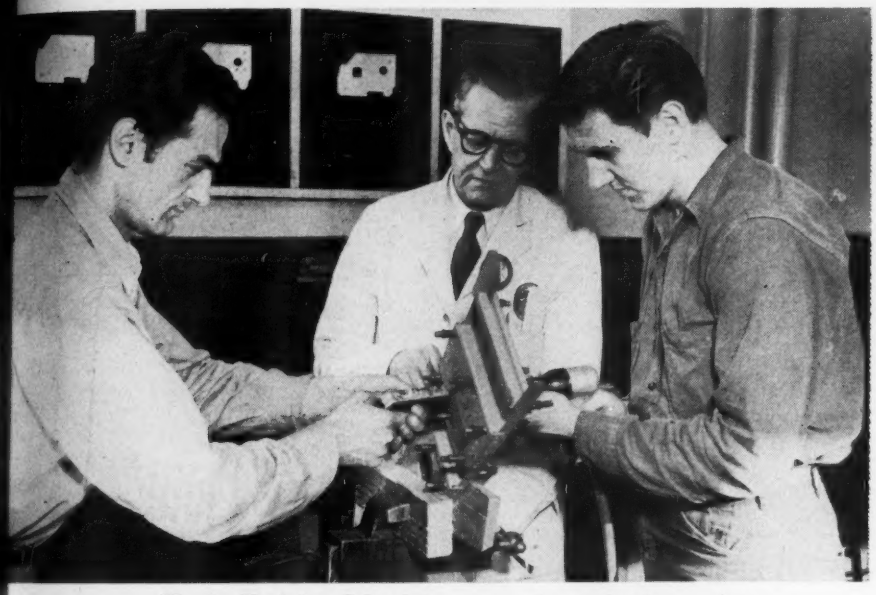


scheduled contracts, by the proper utilization of space and manpower and a continuing increase in tooling.

Work on many new contracts is already underway as a result of America's security armament program. To relieve the home factory of much personnel and space-consuming work, the Company is sub-contracting work in several phases of manufacturing. This is particularly true of fabricating, assembly work, (plus fabricating), and electronics packaging. Electronics, a vital factor in aircraft manufacturing, is the present production bottleneck. Materials and parts are critical, and trained personnel is difficult to obtain in this new field.



A Martin P5M-1 Marlin flying boat begins to sprout the wings which will eventually carry it on long over-water anti-submarine patrols. The airplane in the foreground has been undergoing water tests in which the inside of the hull is filled with water to see that there are no leaks.



Martin Training School instructor (center) gives pointers on riveting techniques to two new employees, as part of the Company's vestibule training plan for new unskilled workers.

By getting out of civilian production and into defense work in an orderly manner, Martin is following the pattern of a large portion of the Nation's industry. It is sharing, however, a common industrial mobilization problem—the personnel pinch.

The employment problem is particularly acute in the engineering departments. Many of Martin's present engineering staff are members of active and inactive reserve units, and may be called into service at any time. Moreover, college engineering students are not being graduated in sufficient numbers to fill the demand, particularly in electronics and electromechanical fields. Many engineers have been deferred up to the present time, but for a few months only. This means that the short period of grace must first be devoted to finding an engineer replacement and then allowing time for the adjustment of his personal engineering techniques with Company methods.

To fully utilize its engineers, Martin offers many mobilization training courses. For example, one special plan is the "Engineering Trainees" program. It was inaugurated on October 1, 1950, when 18 "sample" 1950 graduates were picked from various colleges and employed by the Company with specific assignments in mind. These young engineers are assigned to one of six engineering departments, given two months training in the home department, and spend the remainder of the year rotating between the other departments contingent upon their specialized field. Six departments are included in this plan: Aerodynamics; Structures; Electro-Mechanical (design authority); Electronics; Production Design; and Flight Test. Time spent in each related department varies with the work for which the young engineer is scheduled. At the end of the twelfth month, engineering trainees are permanently assigned home departments.

Martin also has a Shop Familiarization Course for engineers in which veteran engineers lecture on phases of shop manufacturing which affect design economy. Classes in such subjects as advanced differential calculus and supersonic wing theory are also held in order to broaden the technological background of the engineer. Electronics drafting courses are open to engineers familiar with structure but not electronics, as the Company believes much of its expansion will be in the latter field.

As one spokesman for the Martin Company has said, "In the main, improved production will depend on engineering ability, mass production and sub-contracting." Careful planning now assures the Glenn L. Martin Company of sufficient tooling and trained manpower to produce tomorrow's steel doves of peace or wings of war.

A sheet metal class in the Martin Training School provides more training against the day of all-out Company mobilization. Four experienced instructors supervise the progress of trainees.

Will the emergency years ahead cost us our personal freedom?

THE FIGHT FOR OUR WAY OF LIFE

By WILLIAM H. RUFFIN,

President, National Association of Manufacturers, and President, Erwin Mills, Inc., Durham, N. C.

We live in a period which should be one of glorious achievement and almost breathtaking progress for all mankind. Science, technology and industry have given us a mastery over our physical environment unknown in the past. The harnessing of the atom promises limitless energy to do the world's work. Time and space are being compressed or expanded to serve man's innermost longings and even his whims. Almost daily, the boundaries of our scientific knowledge are pushed back and burgeoning technologies give us more useful tools. Industry finds useful applications for the discoveries of science and, aided by the technologists, converts them into products which serve the needs of mankind.

Certainly, from a scientific and technological viewpoint, we might well hope that we are on the threshold of discoveries which could put to an end, all over the world, the age-old struggle for the food, clothing and shelter men need for survival. It takes no great imaginative effort to visualize the day when poverty, famine and pestilence could be banished from the earth and when all men—in China and India as well as in the U.S.A.—could live as human beings should live, with time and energy for things of the spirit after providing for their material wants.

Ours might well be the brightest period in the world's long history, an era of bounding spirit and great achievement, a time in which the heretofore unending and sometimes bitter struggle for a mere existence could give way to a wholly new mode of living. In this exhilarating atmosphere, men everywhere might for the first time be free to pursue happiness with substantial hope of success, apportioning their energies among economic, social, cultural and intellectual endeavors.

But the dawn of this long-awaited day has been deferred by the rise of a political and economic philosophy which threatens to destroy the socio-economic-political system which laid the foundation and erected the strong framework for this nobly-conceived structure. Were the adherents of Communism to triumph, all the progress we have made would be erased and all hopes of reaching this goal in the foreseeable future would be extinguished.

Thus, our task today is the two-fold one of assuring our own survival as a nation and safeguarding the only economic system ever developed by any people which enabled them to raise their living standard year after year. Only in this manner can our way of life, our concept of progress, and the means for achieving that progress be preserved.

In modern times the strength of a nation is dependent primarily on its productivity — its capacity to produce whatever may be needed by its people and to produce such goods in abundance. There are other factors, of course, but the most important single determinant is the nation's ability to produce the vast quantities of weapons and supplies needed by its fighting forces, and at the same time keep its civilian citizens in fighting fettle by satisfying all their essential needs.

This puts a weighty responsibility on American industry and one which industry recognizes must be discharged at all costs. Manufacturers are deeply conscious of this responsibility and through their national association have pledged, as they did in World War II, that the full needs of the country will be met. Today, they are soberly at work gearing production to urgent needs, increasing their over-all output, and in other ways making good their pledge. To all who are familiar with what is being done

it is apparent that the production miracles of 1943-45 will give way to still greater ones, and that nothing less than a crippling inflation or other catastrophe could result in any essential needs going unmet.

Engineers, because of their close association with and important roles in industry, are well aware of the many extremely difficult problems which manufactures face in adapting their complex and often vast operations to the country's changing needs. But they may not fully appreciate how those problems are complicated and magnified by two dangerous forces with which the country must deal, and deal effectively, if it is to survive.

The first and most immediately threatening of these forces is inflation. Inflation can destroy a country just as effectively as the triumph of an enemy's arms. It can close factories, stop the farmer from planting, make life insurance and savings worthless, and put a halt to all human activity except that devoted to a panicky, savage scramble for the dwindling supplies of food and other essentials.

FORTUNATELY, the American people appear to be ahead of their leaders in recognizing the danger and in being willing to accept the practical measures necessary to prevent a further depreciation of their dollars. They have accepted the general principle that henceforth all governmental expenditures must be matched by tax collections, and have given strong support to other recommendations in the program which the nation's manufacturers, through their association, have proposed to Congress. Briefly, this program recognizes that we must pay for our defense needs either in taxes or in inflation, and that the only safe and equitable method is through a sound tax policy which distributes the burden fairly on all segments of the population. If it is adopted, and if credit and spending are wisely controlled, the most immediate threat to our economy and national security will have been removed.

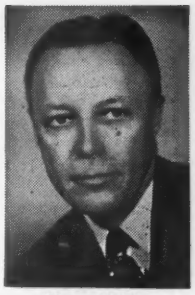
The second grave danger we face is that we may be led into accepting a government-controlled economy. There is a disarming logic in the argument that a controlled economy is a strong one. Fallacious as the reasoning is, people can be led into believing that the way to get efficient production is to give the government power to decide what things are needed and then order them produced. In this naive view, it's as simple as that. Actually, of course, a government-managed economy is a frightfully inefficient one.

If this country is to survive, it is essential that we understand *why* our economic development outpaced that of all other nations. Our progress was no accident, no fortunate circumstance. It was due to the unleashing in human beings of certain creative forces that remained dormant in people elsewhere. If we but will, we can discover the real reasons these creative forces came to full flower here as nowhere else in the world. So long as we are confused on this question, we are in danger of inadvertently damming up the wellsprings which nourished our growth.

To get at the basic reason our economy grew so vigorously, some oversimplification is necessary. Undoubtedly there were many factors which contributed to this country's phenomenal rise, such as the abundance of natural resources, the challenge of a new land to explore and develop, the stimulating climate, and the hardihood and resourceful spirit of the early settlers. All these and many other reasons are given to explain why Americans, starting from scratch, so soon were enjoying a standard of living no other people ever had known.

The inadequacy of these explanations should be apparent. Other parts of the world are as rich in resources, and have similar climatic conditions. Other nations have vast

William H. Ruffin, NAM president, is head of Erwin Mills, Inc., Durham, N. C., employers of 7,400 persons. He has been with the firm since graduating from N.C.U. in 1921, starting as a worker on a weaving machine. When he became NAM's president he said of the defense program, "We must now put aside any differences we may have and unite for the common good and common effort . . . for defense."



Mr. Ruffin

areas of unexplored and undeveloped land. And it is sheer megalomania to believe Americans have a monopoly on inventiveness, energy and inherent creativeness.

No, the basic reason for our unmatched progress is that here, as nowhere else, each individual was free. He was free to work in whatever field he chose, and free to enjoy the fruits of his labors. The enormous stimulus this gave to men is responsible in a large part for the greater achievements and far higher rewards we have come to accept as characteristic of America.

In recent years there has been a progressive erosion of this freedom and today we are submitting to an increasing amount of dictation from government in the interest of resisting a foreign dictator's designs on our freedom. Within the limits referred to earlier, and temporarily, it may be necessary to accept a larger measure of government control over our economy, but we must guard that the controls do not become crippling and that they are not fastened upon us permanently.

In time of national peril, people can be motivated to do whatever their government asks them to do if they believe that by so doing they add to their own and their country's security. But even the gravest emergency, if long continued, ceases to be an emergency. Appeals to work harder, unless backed up with tangible rewards, after a time lose their effectiveness. Production slows and morale takes a nosedive. The only remedy then is a return to a free economy with its built-in motivations, or the establishment of a police state with raw force the activator. History records no instance of a government which relaxed its controls

Mr. Ruffin says that America's success stems from our individual freedom of doing the sort of work we want to do and enjoying the fruits of labor.

The dreaded ration line. Will it become a permanent part of our economy?

when compulsion ceased to work, but history books are filled with accounts of the rise and fall of dictators.

Manufacturers, whose success or failure depends in no small measure on their ability to motivate people, have long emphasized that there are dangers in government controls and that unless these dangers are clearly understood, our marvelously productive economy may one day be devitalized.

If inflation is curbed and our partially-controlled economy stops short of robbing men of their initiative and incentives to work, there is no question that American industry will deal effectively with the many other problems growing out of mobilization. Industry's greatly expanded plant and the technological contributions of the past several years will enable manufacturers to produce in vastly greater quantities than ever before. So far as can be foreseen, every need of the armed services can be met and civilian standards still be maintained at a reasonably high level.

Governmental policies have a far wider influence on industrial production than is generally realized, even by those who are experts in one or another field of industrial activity.

The government's action in a labor dispute, for instance, can have a seriously unsettling effect on labor-management relations, not only in the industry concerned, but in all industries and in every company. Even a relatively minor thing, such as a faultily-drawn order restricting the use of a scarce material, can have wide repercussions, slowing down and even halting great companies. Tax policies can encourage or freeze the expansion of plants and launching of new companies. There is scarcely a single aspect of industrial activity that is not vitally affected by the policies and actions of government. This should be kept in mind at all times when considering industry's problems and potentials.

What are some of the special problems industry faces in this emergency?

A prospective shortage of manpower is one. In some areas engineers and certain other specialists already are in such demand that there is lively bidding for their services. It is certain that industry will have difficulty in finding enough skilled and experienced workers and will be forced to utilize large numbers of the inexperienced and untrained.

The over-all picture is less clear. The manufacturing industries today are employing about 16 million people. That is about 1.4 million below the peak attained in World War II, but production per man-hour has gone up since war days. Industry is much better prepared than it was in the last war to use the services of women, older workers, and the physically handicapped. How many workers from such groups can be drawn into industry is largely a matter of how great is the need. The handicapped, in particular, have been found to be valuable workers, and an increasing number of them were being employed before any manpower shortages appeared.

Labor-management relations, always a critical factor in production, improved rapidly in the years following the war. The national policy set forth in the Taft-Hartley Act brought a new stability into labor-management relations. Increased efforts of employers to develop policies and practices which recognized each employee as an individual, with interests and desires of his own, contributed to a warmer human relationship and better understanding. Out of this came a clearer realization of the mutuality of interest and better teamwork.

THE allocation of materials necessary to assure production of essential goods creates serious problems for the manufacturer who is faced with a shutdown because he cannot get the steel he needs for his baby carriages, for example, and cannot immediately switch his production to something else. The situation is critical, especially for many small manufacturers who cannot qualify as prime contractors on DO orders and temporarily are unable to get subcontracts. Unless they keep operating, they risk the loss of their trained workers and possible bankruptcy. The nation's over-all production is lowered and some areas are hard hit by unemployment.

Unfortunately, when materials must be allocated, there is no way of avoiding some disruption of production. But we can ask that our government do everything possible to minimize the harmful effects of its necessary actions and smooth the way for small manufacturers to participate more fully in the productive effort.

Finding capital for expansion will continue to be a major headache for industrialists. The drying up of venture capital has plagued industry for years. Now, with new taxes taking an even greater share of the profits which companies normally would plow back into larger and more efficient plants, this obstacle to industrial growth might easily turn into a real roadblock. It is understandable that when taxes must be increased there is a tendency to think first of business profits as a possible source. What few persons realize is that profits which go to the tax collector are prevented from serving an even more important function—that of stimulating the business and industrial expansion on which our living standard depends.

These are but a few of the problems confronting manufacturers. Many will require bold thinking and sound judgment for their solution. But if government prevents further inflation and avoids cripplings controls, the experience gained by industry's managers in the last war and in the fast-changing postwar period assures that workable solutions will be found.

One clear fact stands out. It is that a vast expansion of our economy is the key to our survival. We must build an economy so enormously productive that no enemy would risk engaging us in war. We must produce so abundantly that we can supply everything needed by our fighting forces and at the same time keep raising the living standards of all our people.

Only by expanding our economy can we be strong enough to discourage aggression and advance the day when men can again devote all their energies to peaceful pursuits.

What about education and our defense program?

Training Engineers for Tomorrow

By DR. LEONARD CARMICHAEL
President, Tufts College

DURING the second world war the dependence of our armed forces, our war industries, and our essential civilian economy on engineers and scientifically trained personnel became clear as never before. Today America is again in a mobilization period. This time our country may be required to retain our armed forces in at least a semimobilized state for a decade or more. The importance of planning to continue the basic aspects of education that are needed both by the armed forces and by the civilian economy for a long period of years becomes especially urgent.

The American college student does not wish to be deferred from military service because he is in a favored group. The student does not wish to be given a special privilege of continuing his college work when like-aged young men who are not in college are being called to the colors. But most American college students will agree to remain at their studies if it is made clear to them by competent national authorities that to do so is to give patriotic service. Is it therefore not true that all of us who are concerned with the technical aspects of American life should do our best to see to it that our nation does issue such instructions? Some of our ablest young men must remain in training and not go immediately into the armed forces if our nation is to continue at its maximum strength. Such temporarily deferred men can then give military service equal in length of time to that given by any other young man after they have secured some of the essential intellectual and professional skills which higher education alone can confer upon them.

The importance of this problem once again makes education a general matter of public concern.

Today, therefore, it seems appropriate to consider together some of the basic factors which lie behind professional and general education. Only by facing these problems in a complete way can we really formulate an appropriate over-all national mobilization policy. In a democracy informed opinion is basic to proper and unified action.

No one has ever succeeded in giving a fully satisfactory definition of what education really is. From one point of view education is as complex and as long in duration as life itself. We can, however, always look at formal education as it actually is and evaluate its present forms.

Education in a narrow or professional sense is the means used by society to make very diverse young human beings as able and effective members of civilization as possible. Education is also required to make some individuals skillful enough to perform the great variety of specialized tasks which our modern industralized economy demands.

Engineers do not need to be told that they are a specialized and distinguished audience. They are part of what is possibly the world's most constructive profession. But in spite of this unity of interest, I doubt if they all agree now in regard to what formal education should do for young people. Let's examine ourselves. If you could be educated over again how would you change your actual school and college experience? Is the education that you are providing for your own children and the education that you expect in your subordinates and in your secretaries the same? If not, what is the basis of the difference?

Much education has always and must continue to take place in the home. Much education should also take place in the church and in religious organizations associated with the church. Aside from education in the home and church and that acquired in informal community organizations, education is primarily the business of public, nonpublic, and private or profit schools. As citizens we are right in demanding that such educational institutions perform their special functions in as effective a way as possible. We want our schools at every level not only to increase the technical skill of all students but also make those who attend them better adjusted human beings and more effective citizens of our free nation.

LIKE all other educational institutions, engineering schools must give both technical and specialized training

Before students enter such institutions of higher learning as the University of Virginia shown here, the author believes their abilities and interests must be carefully measured.

The author thinks that students will remain at school rather than join the services, only if it is made clear to them by competent *national* authorities that to do so is to give patriotic service.

and general education. The term general education is today used in various ways. In certain of the great universities of the Middle West a program of general education has been developed which is concrete in its aim. It is intended to prepare each student as effectively as possible for modern life. Required courses are given which are intended to provide the individual with knowledge about the laws of health, the duties of citizenship, the problems of home life, the ability to use good English, the ability to spend leisure time in a constructive way, and last but not least to imitate some vocational training.

This is not the only modern meaning of general education, however. Many of our older colleges of liberal arts, following a pattern first given great emphasis by Columbia College of Columbia University, now aim to instruct all students in the basic factors which have made our contemporary civilization. In various ways in different liberal arts colleges this point of view is emphasized. Courses are offered that are related to the principal cultural trends that have made our civilized society what it is. Such studies necessarily include a careful review of the main contributions made to man's thought in Greece and Rome. They also emphasize mediaeval philosophy, the Renaissance, and the Industrial Revolution. Economics, history, science, philosophy, the fine arts, music, and literature are brought together in different ways in such general studies. Each program is organized in an effort to give the individual a general picture of man's evolving thought about himself and society, with an emphasis on the civilization of the Western World. General education in this sense is an important and a subtle thing. Courses of this sort can nevertheless easily degenerate into what used to be called an "ornamental education."

When properly organized, however, general studies of the sort just described provide at least certain thoughtful students with an enlightened way of thinking about the basic problems of man and his world which can probably be secured in no other way.

But is it a mistake to think that all intellectually able students can equally profit by such an abstract study of the theory of civilization and of philosophy? Some very able American boys and girls are "concrete minded" and will never find such necessarily abstract and highly verbal material interesting. Would it be a mistake to try to force all such individuals to master this program of courses in general education before starting on specialized education?

Most engineering school faculties believe that at least for some boys and girls it is better to give a combination of general education and an education in applied science at the same time, rather than in serial order. Engineering students often like to think of themselves as extremely practical-minded. The engineering schools of the country in dealing with such students face the difficult problem of assuring themselves that they are not neglecting real general education but that at the same time they are not postponing the study of applied science and technology for too long a time. The problem of developing an ideal curriculum for engineering schools thus becomes most difficult. In four short undergraduate years each engineering student must ideally become well acquainted with the basic principles of really advanced mathematics, with modern chemistry and physics, with engineering drawing, with English, and public speaking. At the same time he must gain as effective a knowledge of general education, that is, of the social and humanistic background of our age, as possible. All of these studies must be presented to the undergraduate engineering student in eight terms of four or five courses each; but during this period the student must learn as much as possible of the technical knowledge of mechanical, civil, electrical, and chemical engineering so that he will have some immediate skills that will be of value to a prospective employer when he graduates.

It can readily be seen, therefore, that undergraduate engineering education today has to be a most carefully developed synthesis. All in all this program is today surprisingly successful.

In the old and established Tufts College Engineering school, which I know best, there is a general feeling that in four years of hard intensive work our students do gain a fundamental education in all the aspects of work that I have just enumerated, but they have to work very hard to do so.

Always in thinking about education we must remember that all students are not equally well adapted to undertake all kinds of education. If American education is to be strong, especially in what now seems to be a long period of partial military mobilization, it must be recognized that all individuals are not equally talented or able in ability to do all types of academic work.

There has never been a time, therefore, when modern tests and guidance procedures have been more important than they are now. Only by the use of such well-developed tools of educational and vocational guidance can the individual secure the opportunity that he deserves to gain the best sort of education for one of his often really unique interests and capacities. This point of view is still too little recognized even in many of our great universities and colleges. In some universities it is by no means uncommon to find students today studying mathematics and science who would be much better advised to study literature and the fine arts. Similarly not a few students in our colleges of liberal arts would have been much more interested and much more able to do in an effective way the work of an engineering school than they are to carry forward the essentially linguistic studies in which they are now engaged. Because I am connected with an institution which attempts to study in as great detail as possible the capacities and interests of each individual student, I may be especially concerned with this problem, but there seems very little doubt that in the future we must measure the abilities and interests of individuals who are to be educated as we have seldom done before.

In conclusion then, it can be said that in a period of military mobilization or in a period of constructive peace the real educational needs of the individual should always

be considered in planning a proper education. It is further important, however, not to plan the education of an individual on too narrow a basis. The rule-of-thumb man is all too often left behind by scientific and technological advances. This is one reason why in the future our country will almost certainly demand that its specialists be generally educated citizens as well as technical experts.

We educators appeal for help. Engineers are a most influential professional group in our greatest technology. If the goal of a modern education that is both scientific and general and that fits the individual student is to be achieved, it will be because of the engineers' support and the help of other citizens like them. Above all, we appeal to the engineer to use his influence to help those who demand that education shall require hard work on the part of its students and that it shall at least open the road for the diligent to a life of broad citizenship and of vocational experiences.

It is a relief that Congress has finally passed and the President signed the new mobilization act. Many thoughtful students of manpower, however, are disturbed by what this act leaves out rather than what it includes. So long as General Hershey remains as administrator of the Selective Service System we can be assured that higher education will have full consideration. The new legislation still allows the determination of whether or not we are to have trained manpower to be decided by the individual local boards of the country.

Now more than ever before our society in peace and in war depends on technology and upon the real wisdom and integrity of our leaders. Education plays a basic part in preparing these leaders. Thus today real education demands the active and continuing support of all thoughtful citizens. It especially needs the help of Americans who are leaders in the great and constructive profession of engineering.

Auto Industry

(*Continued from page* 10)

dustry with most of its required assemblies and sub-assemblies. In many cases, airplane makers confined their efforts to assembling parts already made by the auto makers.

For example, in bomber assembly plants at Omaha, Kansas City, Tulsa and Fort Worth, in some cases, only 22% of the actual man-hours necessary to complete a bomber were expended there. The automotive and associated industries had spent 78% of the man-hours necessary to make the bomber before it ever arrived at the aircraft factories.

Both in World War II and in the present mobilization, the auto industry has followed a policy of "staying out" of the airplane business. Most airplane manufacturers, even in the first, dark days of World War II, viewed the entrance of the auto makers into their bailiwick with considerably less than glee. The smaller airplane makers foresaw post-war competition with such corporate Collossi as General Motors, Chrysler, and Ford. There was considerable quaking in the corporate boots. The automobile companies joined in issuing a pledge that none of them would remain in the airplane business in the post-war period and that their role would be confined to that of sub-contracting from the aviation companies during the war. The pledge was kept.

The relationship worked well and has set a pattern which remains the basis for co-operation between the industries today. A kind of "shotgun" wedding was consummated with the aircraft makers the reluctant bride. The marriage turned out better than pessimists expected, however, and if a full scale mobilization is necessary, the same arrangement would, no doubt, prevail again.

Probably the same kind of arrangement will be worked out with the machine tool industry.

Harold R. Boyer, Deputy Administrator of the Defense Production Administration, and Chairman of the Aircraft Production Board, has urged the Automobile Advisory Committee of the National Production Authority, made up of top management in the industry, to make the plunge into machine tool production. Mr. Boyer declares that the aircraft production schedule will be "purely academic" until high-level machine tool production is achieved.

Perplexing problems for engineers in the industry are foreshadowed by Mr. Boyer's advice that the auto makers do their own tooling-up and rebuilding of their own old tools instead of returning them to the manufacturers.

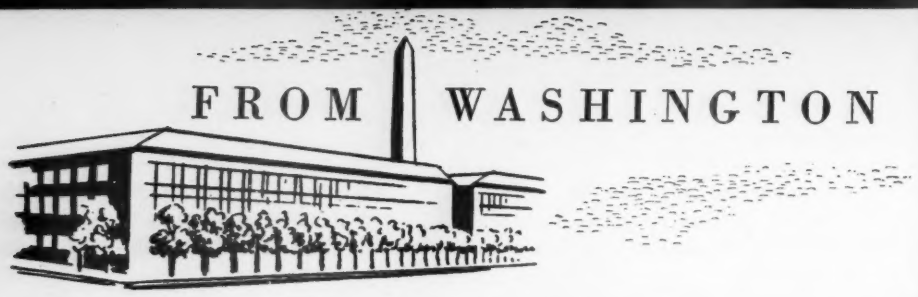
Spokesmen of the industry say that Detroit will get into active tool production when the government removes the "bottlenecks" of price controls and inadequate financing for working capital.

Meanwhile, Detroit, backbone of the industry which itself is the backbone of our production effort, is in the curious position of facing an unemployment crisis in the midst of a rearmament program. Chamber of Commerce officials and other business and labor groups have made representations to Washington to release larger quantities of materials for civilian auto production.

Alarmed by mounting unemployment and loss of buying power on the part of consumers, UAW-CIO President Reuther has called for a "high-level Government task force" to remove bottlenecks in the conversion of idle automobile manufacturing facilities to machine tool production. Reuther has also requested top level automobile management to set up machinery "on the operating level" to work out the gigantic engineering and other problems incident to co-ordinating machine tool conversion problems.

Pressed by shortages of copper, aluminum, molybdenum and steel, and with myriad problems of converting civilian production capacity to defense, engineers in the automotive industries face an unparalleled challenge. All kinds of new ways of doing things must be found. Substitutes must be devised to take the place of unavailable metals. Now is a time of stress and change in the Motor City, when management depends on the skill and ingenuity of its engineers more than ever before. It is a challenge and an opportunity for professional engineers to again demonstrate their worth.

This Government-owned plant next to the Chevrolet-Saginaw transmission plant is being equipped with machinery for the production of tank transmission parts.



FROM WASHINGTON

By
Arthur R. Woods,
N.S.P.E.'s Legislative Analyst

MAJOR LEGISLATIVE ACTIVITY SINCE THE FIRST OF THE YEAR centers almost exclusively around the cold war, the war in Korea, and the mounting defense program. By virtue of the international situation, the Congressional supporters and the Administration have had to forego any real insistence on a 'fair deal' program.

MOST VEXING PROBLEM FROM THE BEGINNING, and still continuing, is the proper allocation and distribution of available manpower between the armed services and the defense economy. It has been predicted that a record labor force of 68,500,000 will be urgently needed by fall. At the same time Armed Services needs will increase.

AVAILABILITY OF TECHNOLOGICAL, SCIENTIFIC, AND ENGINEERING MANPOWER, however, presents the most difficult problem. **Scientists and engineers are not made overnight.** The number of engineers now available is known; the number of graduates for the next few years can be predicted with accuracy. **These figures, when added, are not encouraging.**

GOVERNMENT AGENCIES AND THE ARMED SERVICES are becoming more and more aware that effective use must be made of trained personnel. It is becoming more and more clear that without **adequate engineering services** the expanding defense economy would be in danger of falling far **short** of its goals.

MUCH, HOWEVER, REMAINS TO BE DONE. Too often legislation has been passed in general terms. **Too much reliance is placed on circumstance and shortage to bring about effective use of the limited number of engineers.** No really valid overall policies or working controls have been established.

NEW SELECTIVE SERVICE LAW makes no provision for a supply of "seed corn" engineers and scientists. There is no specific provision for a continuing flow to fill increasing needs or to replace those lost from normal attrition. The Universal Military Training Law says nothing concerning such problems.

PROPOSED CHANGES IN LEGISLATION GOVERNING ARMED FORCES POLICY FOR RESERVES do not take into account the relative value of the contribution which might be made by the engineer to the Armed Services and to the defense effort. Recent studies indicate that 25% of the engineers under 35 years of age have reserve status; 37% of those under 30 years of age are in the same position. **A general, indiscriminate call of reservists could cause heavy losses to a profession vital in defense production.**

RECENT REPORT OF LABOR DEPARTMENT STATISTICS shows approximately 10,500 professional and managerial jobs referred to United States Employment Service for national placement. Vacancies cannot be filled locally. **Openings are almost entirely for engineers—civil, chemical, electrical, industrial, and mechanical.**

MANY DEPARTMENTS AND BOARDS DEAL WITH MANPOWER REQUIREMENTS. Some have overlapping functions. Most important, perhaps, are those directed by the **Office of Defense Mobilization's manpower assistant Dr. Arthur S. Flemming, and by Labor Department's Defense Manpower Administrator Dr. Frank P. Graham.** In addition there is the ODM Committee on manpower policy composed of high ranking representatives from various government departments.

PROPOSALS FOR FORMATION OF NATIONAL SCIENTIFIC PERSONNEL BOARD remain dormant. The Scientific Advisory Committee to the National Security Resources Board recommended its creation. Outstanding **scientists and engineers** were to be included in the membership. The Board's most important proposed function was to determine the availability of scientific manpower, and to make requested allocation to industry and the armed services on the basis of relative need. **No action has been taken concerning this recommendation.**

THE NATIONAL SCIENCE FOUNDATION faces a drastic appropriations cut from a requested 14 million to an allotted 300 thousand dollars. NSF had planned to spend 8 million dollars on basic science research; 5 million dollars for 2100 graduate fellowships in **science and engineering.** Those plans are probably gone. The 98% cut will permit NSF stand-by existence only. Plans to survey the technological fields and plug gaps in our basic knowledge cannot be carried out.

THE GREAT LAKES-ST. LAWRENCE SEAWAY PROPOSALS have once more been defeated in committee. No further action appears possible in the current session of Congress.

THE HOOVER COMMISSION RECOMMENDATIONS, approximately 50% of which were adopted last year, have run into difficulty in this second session of the 81st Congress. Very nearly all of them are bottled up in committee. Among the bills now inactive are those establishing a **Board of Impartial Engineering Analysis, and those transferring the civil functions of the Corps of Engineers to the Interior Department.**

MILITARY PUBLIC WORKS BILL may authorize construction at military and naval installations in the amount of 6.5 billion dollars. This is by far the largest single public works bill in United States history. The money, if appropriated, will be spent for construction and rehabilitation of Army, Navy, and Air bases in nearly every state in the Union and in some foreign countries.

DEFENSE PRODUCTION ACT has been extended, modified as to price controls. Wage and salary provisions are little changed. There is not much likelihood, however, that tight wage ceilings can be maintained. The basic 10% limitation on increases, broken through earlier in individual cases, has been modified. A supplemental living-costs formula has been tied-up to the United States Price Index. An additional 2% rise in pay is permitted to offset the 2% rise in the index from January to June of this year.

THE WAGE STABILIZATION BOARD sets the pattern for the Salary Stabilization Board. The Salary Board formerly controlled pay for all professionals. Under the extended law, doctors and lawyers are exempted; **other professionals still covered.** Salary Board controls are somewhat more restrictive than those of the Wage Board. Office of Price Stabilization specifically **exempts from control fees of self-employed engineers.**

ARCHITECT-ENGINEER CONTRACTS WITH THE FEDERAL GOVERNMENT continue to cause concern. The Defense Department, by administrative ruling, appears to have departed from Congressional intent as expressed in pertinent legislation. Professional Society views have been presented in writing to the Department. **These views, following long accepted practice, if adopted, would facilitate prompt and efficient handling of contracts.**

FOREIGN AID APPROPRIATIONS FACE SEVERE CUT. Both Senate and House Committees agree in chopping 1 billion dollars from the 8.5 billion asked by the executive department for foreign aid. Disagreement lies in where cuts should be made. The Senate Committee wishes to reduce military aid; the House Committee has pared economic assistance. **The Point 4 program will undoubtedly be affected by the cut if the House views prevail.** Some economies will certainly be effected, here and elsewhere, in view of the 56 billion dollar defense appropriation bill passed by the House.

THE TAFT-HARTLEY LAW, except for minor modification, will not be touched by this session. The administration is undoubtedly going on an "all or none" basis, and will save the issue for the 1952 campaign.

book looks

Title: Making Western Europe Defensible.

Authors: Theodore Geiger and H. van B. Cleveland.

Published by: National Planning Association, Washington, D. C. Price: $1.00.

This important pamphlet was prepared originally as a report of the International Committee of the National Planning Association. The Association itself is an independent, nonpolitical, nonprofit organization which was established in 1934 in an effort to integrate various groups such as labor, management, agriculture, government and the professions toward a program of common progressive objectives.

The pamphlet points out that our pre-Korea policy toward Europe was based on the idea that her difficulties came about principally from the effects of war on European economy, and that this problem could be overcome largely by large-scale dollar assistance. Since the outbreak of Korean hostilities, however, our policy has shifted to include another assumption; that Europe's security against aggression could be restored by national rearmament programs, loosely coordinated through the advisory committees of the North Atlantic Treaty Organization. In other words, American policy in Europe has shifted "from recovery to rearmament."

Making Western Europe Defensible attempts to point out the inadequacy of these two assumptions as a foundation for our European policy, and to show that their inadequacy arises from the fact that they deal with symptoms rather than the underlying causes of Western Europe's defenselessness.

The authors point out that "it is important to realize that neutralism and anti-Americanism on the continent are mostly reactions on the part of many Europeans to their continued inability to satisfy the natural desire of any self-respecting people to be master of its own destiny and independent of the charity and protection of others." This they take to be the true cause of European unrest, in contrast to the isolationist attitude that Europe is an ungrateful child, and more of a liability than an asset. They feel that our most efficient means of ensuring Western Europe as a strong American ally is to assist her in becoming "strong, self-reliant and independent of American aid."

In conclusion, *Making Western Europe Defensible* suggests that if we wish to avoid fighting a third world war in order to prevent a disastrous kind of European unification, we must aid Europe in forming the only sort of union which will serve its own interests and with which we can most easily live. This European union should have strong democratic tendencies and be able to guarantee economic and political rights of the individual. Our effectiveness as partners in the formation of this initial union may determine whether or not the Continent will contine to be our future ally.

Making Western Europe Defensible is available for $1.00 from the National Planning Association, 800 21st Street, N. W., Washington, D. C.

Title: War and Human Progress.

Author: John U. Nef.

Published by: Harvard University Press, Cambridge, Massachusetts. Price: $6.50.

If a third world war breaks and puts an end to civilization, the blame will lie with modern society. In *War and Human Progress*, Mr. Nef shows why the disease of war, its ravages limited in the past by moral, intellectual, and cultural restraints, has today become malignant; it will be difficult for the public to sidestep his conclusions concerning the requisite and drastic treatment.

Mr. Nef presents the history of war as part of the general history of Western civilization: his book is a synthesis of industrial, cultural, and military history. He shows that it was not war, but limitations on war, which made possible the birth of industrialism and its eventual triumph. The Christian view of human nature as corrupt and sinful, the Platonic tradition, and the medieval habits of craftsmanship which put elegance and delight before utility—all imposed spiritual or technological limitations on war. A further restraint was the application in education and politics of moral imperatives—which originated in the Christian faith and which supplied an orderly framework for relations within and among nations.

The author lays bare the gradual breakdown of the restraints of war. The growing valuation of the common man gave moral support for general conscription. The rise of philosophical positivism and relativism undermined moral imperatives. The ideal of elegance ceased to interfere with the production of efficient weapons. The values of the new industrial economy cut the ground from under polite manners, intellectual standards, and the imaginative sides of human nature. As science and technology helped to create an economy of abundance unknown to history, the use of new and overwhelmingly destructive weapons on a world scale was made possible. All roads led to the total warfare of the twentieth century.

If the very advances that men have made are not to destroy mankind itself, human beings and nations must renounce in large measure the goal of success as the guiding principle of thought, labor, and even of politics. We, like our ancestors, possess faculties for common sense, for rational speculation, for craftsmanship, for art, for love, for charity, for faith. Man's future depends upon the encouragement given these faculties. As Mr. Nef points out, "The cult of violence is actually no substitute for material gain, nor is it an equivalent for redemption. The appeal to force is an extension of greed and so even more corrupt than the profit-seeking systems of the nineteenth century which stopped short of force. Violence is a substitute for redemption in the sense that Hell is a substitute for Heaven."

(*Continued on page* 36)

Notes From **PITMAN**

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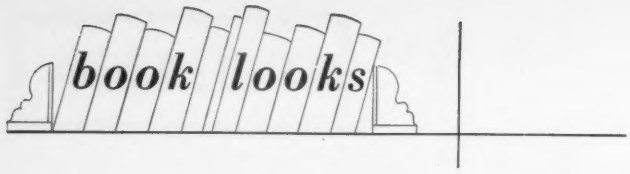

(*Continued from page* 34)

In concluding *War and Human Progress*, Nef states, "Let us not hoodwink ourselves with notions of perpetual peace and of the millennium. These only increase the danger of war, for they rest upon a misunderstanding of human nature." Certainly men and women should attempt to create their ideal of heaven on earth if possible, the author says. However, "they should not confuse this with heaven itself. The result of such confusion will not be the gain of either earth or heaven. It will be the loss of both."

Mr. Nef is Chairman of the Committee on Social Thought and Professor of Economic History in the University of Chicago.

Title: Sabotage and Plant Protection.

Published by: Chamber of Commerce of the United States, Washington, D. C. Price: 50 cents.

This booklet was compiled from the proceedings of a round table discussion of this important defense topic at the thirty-ninth annual meeting of the Chamber of Commerce of the United States. Included on the panel were: Melvin H. Baker, President, National Gypsum Company; Richard L. Davies, President, Pennsalt International Corporation; Alex C. Davidson, Supervisor, Labor Relations, American Steel and Wire Company; Major General Francis H. Griswold; Frank V. Martinek, Assistant Vice President, Standard Oil Company (Indiana); and Senator Richard M. Nixon, long known for his congressional work on Un-American Activities.

As Chairman Baker states in his introduction, "Communist infiltration into key industries in the United States is a known fact. FBI Director J. Edgar Hoover recently testified before a Congressional committee that there is a hard core of 43,217 known communists in the United States, trained and ready to sabotage vital industries when given the word to do so."

Baker states further: "There is no longer any doubt that industry and the general public need to be alert to this serious menace in order to prevent not only the crippling of our current productive effort, but the ultimate destruction of our American Democracy."

Anyone engaged in defense production should become familiar with this discussion, which is general in nature, but informative.

Title: Military Management for National Defense.

Author: John R. Beishline, Colonel, U. S. Army.

Published by: Prentice-Hall, Inc., New York. Price: $5.00.

Critical times like these demand more from us than just men, ships, money, planes and guns. They require the highest degree of efficiency in the administration of our armed forces. This timely book presents the military and industrial techniques for achieving this goal.

The first book to apply the science of industrial management to military problems, it fuses time-proven techniques of industrial management with the best principles of military organization.

For a clear understanding of the problems and techniques involved, Colonel Beishline breaks down military management into four basic functions: Planning, Organizing, Commanding, and Controlling. He analyzes in detail such essentials as basic problems in military administration, objectives and policies of military management, military functions, structure of military organizations, leadership and morale in military management and organization, and the composition and duties of the General Staff.

In developing these principles for the solution of problems in military management, Colonel Beishline skillfully blends fact with theory. His book secures for the military a beachhead from which their complex administrative problems can be attacked.

Military Management for National Defense has a special appeal to the businessman engaged in supplying the military, and to the manufacturer of war materials, who must understand military organization in order to sell his products to the armed forces. Engineers engaged in National Defense work should also find this work extremely valuable.

Colonel Beishline's wide practical experience in all echelons of military organization qualifies him to write accurately and authoritatively on all phases of military management.

Other Recently Published Books:

ARCHITECTURAL GRAPHIC STANDARDS. *By Ramsey and Sleeper.* Published by John Wiley & Sons, Inc., New York. Price: $10.00.

The fourth edition of this valuable book for engineers and architects, the book has been expanded and many new plates added. Designed to give standards, facts and data on building, the handsome new fourth edition would be a credit to any engineering library.

PRODUCTION OF MOTOR VEHICLES. *By Henry F. Cunningham and William F. Sherman.* Published by McGraw-Hill Book Company, New York. Price: $3.50.

This book studies the successive management steps required to plan and to bring into production a new model automobile or truck. Anyone concerned with automotive production methods will find it a clear outline of the over-all management techniques needed to meet production problems quickly and confidently. The better part of two years was spent in gaining firsthand information concerning the various procedures outlined in this book. Much of the material presented was derived from actual observation of the processes involved, together with personal interviews with those directly responsible for their execution.

ENGINEERING GRAPHICS. *By John T. Rule and Earle F. Watts.* Published by McGraw-Hill Book Company, New York. Price: $3.00.

Here is a distinctly new approach to the study of engineering drawing that considers the subject from both the analytical and representational viewpoints. In contrast to most engineering drawing courses, which feature almost complete emphasis on the student's ability to make working drawings, this treatment stresses the power of graphical analysis without the domination of professional details and standard practices in special fields. This is the first volume to treat the entire field of graphics as a tool of major importance to the engineer, using drawings as a medium rather than as a manual skill.

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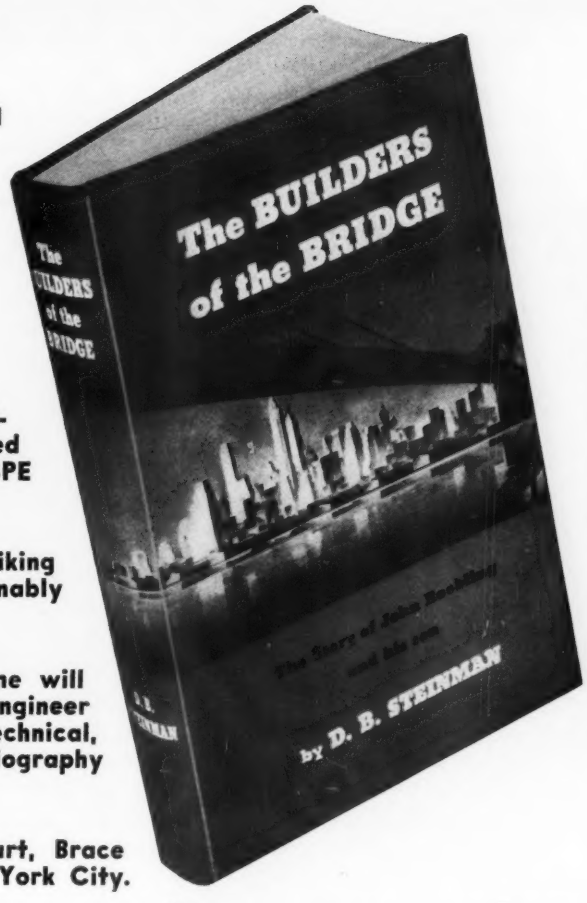

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...about the author

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Air Power

(*Continued from page* 17)

the enemy for a moment—just as we were surprised by the V-1—but he will recover and in due time will neutralize our momentary advantage.

Our answer in Korea should have been *Air Power* from the beginning. We should not have put our men on the ground. With complete command of the air, we could have applied an "air siege," paralyzed the enemy's lines of supply and communications, and prevented the communist regime from controlling its people and reaping the benefit of its aggression. We did not have to lose face or fall on our face. We could have achieved our objectives if we had applied the right kind of military force.

Ignoring the tragic experience in Korea, our military leadership is now grooming us for a similar kind of warfare, on a far vaster scale in Europe. If this trend is not arrested in time, it must inevitably lead to catastrophe. We must remember that, unlike the Chinese, the Russians have not only overwhelming manpower, but also equal if not superior fire power, and that they will be supported by an overwhelming modern jet tactical air force.

The key to an understanding of Europe's present predicament is this: After the last war, we threw away our gun. Soviet Russia held on to hers. Now we propose to stoop down and pick up our discarded weapon. But why should the Kremlin permit us to do this—unless we have a powerful deterrent force elsewhere to stop them from putting a bullet through our forehead?

By proposing more divisions for Europe, our military leaders are in effect asking us to stoop for the gun. They squeeze their eyes tight-shut and then refer optimistically to 200 or 300 millions in the Western bloc who are our allies. This represents *potential* troops—but the Soviet Union has huge and superbly equipped armies already *in-being*, supported by tactical planes as good as ours and much larger in quantity. It is childish to suppose that Moscow will allow us to create West European forces capable of crossing out her dominance of the continent, when it has the power to nip the enterprise in the bud—unless there is a deterrent force.

That deterrent force is American long-range Strategic Air Power that has the capacity to destroy the enemy's industrial power and the stockpile of its huge armies. But, since we do not as yet have that force, we are putting the cart before the horse if we allow ourselves to be coaxed, threatened and argued into pouring more and more of our resources and manhood into surface force!

I am not accusing our leadership of some mischievious conspiracy. The conspiracy is of another kind—like that of a fond mother who believes that castor oil is a cure-all, and administers it to her child in ever larger doses, thinly disguised with orange juice. Her intentions are the best, but her child will die all the same if his abdominal pains are due to acute appendicitis.

Because our leaders do not grasp the possibilities of air power geared to take control of the air clear around the globe, their strategy is wrong. The very make-up of our High Command makes such fallacious strategy inevitable. Secretary of Defense Marshall is a ground general. On June 21, 1943, he declared, "Your adversary may be hammered to his knees by bombing, but he will recover unless the knock-out blow is delivered by the Army." The fact that Japan, having been knocked out from the skies, surrendered with an army of six million well-equipped men still intact, apparently has made little impression on General Marshall, since only recently he declared, "The experience of battle points to the continued and decisive role of ground forces."

The Chairman of the Joint Chiefs of Staff, General Bradley, wrote two years ago that he is "convinced beyond any reasonable doubt" that "we shall once more be forced to gain the inevitable victory over our dead bodies—those of the soldiers on the ground." To date he has not revised or retracted this conviction. And the Chief of Staff of the Army, naturally is no less sold on bayonet warfare. All of General Collins' statements revolve around his certainty that "the doughboy is the final answer."

THE other two members of the high command, representing the Navy and the Air Force, are in a minority and, in the nature of a military body, bound to go along with majority concepts.

When we passed the National Defense Act of 1947 we gave a civilian secretary virtually dictatorial power. Today, with a professional soldier as our Secretary of National Defense, we have lost completely civilian control of the military. The three military services, unchecked and uncontrolled, without any definite strategy, are embarking on a spending orgy in every direction, each in competition with the others, squeezing every dollar out of our inflated and tottering national economy, and fighting each other for the largest share of our limited manpower.

As long as this chaotic state of affairs continues we will never be able to attain an invincible force in the decisive medium of our epoch—the air. Worse than that, if we persist in this profligate strategy, we risk an economic debacle, and will be regimented in the process, losing the very liberties we are fighting to protect.

If this disastrous trend is to be reversed, it is the American people themselves who must do it! And this is why:

Suppose a river is to be crossed, and three experts,—a tunnel builder,

Below: Army Engineers in Korea. Are we using outdated methods?

a ship designer and a bridge specialist —are called in to solve the problem. Each man will honestly insist that his own method of crossing is the most economical and efficient. Being human, he will instinctively react against a solution that would automatically eliminate him from the job. There could be no compromise solution. A "balanced" structure, such as a floating bridge dragged through a tunnel, would be ridiculous.

If the project were left to these experts we would probably wind up with all three: a tunnel, a bridge and a ferry. But, money being limited, the structure would be flimsy and untrustworthy. In the end, the employer would have to make a decision himself. Having heard three sets of claims, he would order the one structure that seemed most desirable. And he would have it built adequate and strong.

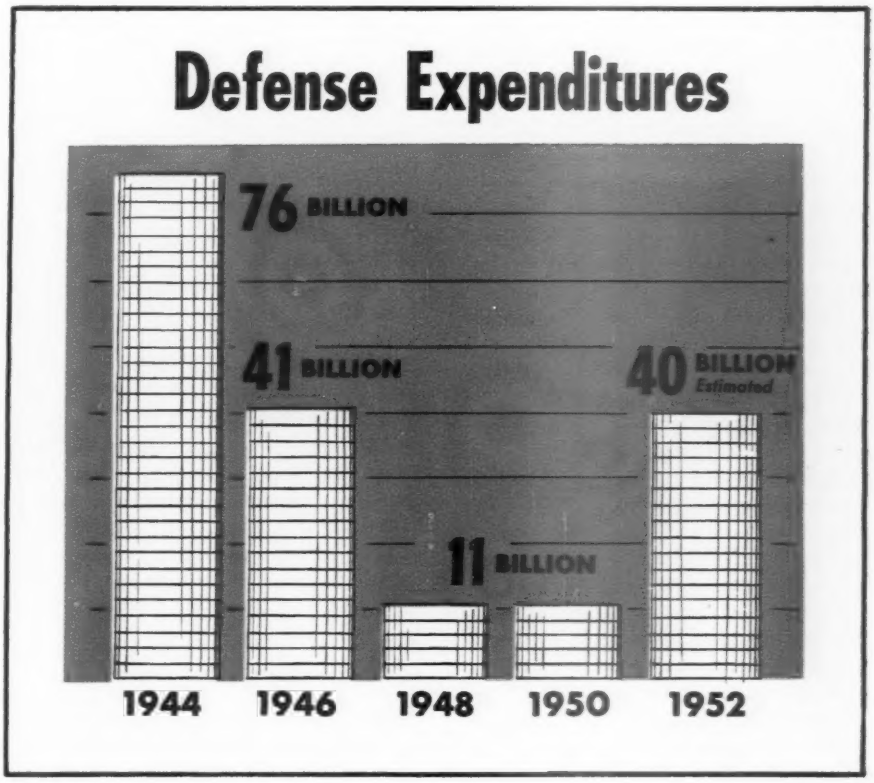
The American people are now in the position of this employer. We cannot support in battle readiness an overwhelming army, an overwhelming navy and an overwhelming air force, and be the industrial arsenal of the free world, all at the same time. Even if we had the resources to do all this, *we simply do not have the manpower.* We must choose one decisive force in the decisive element—and that is Air Power.

There is room for alarm over a recent declaration of our great industrialist, Charles E. Wilson, head of the Office of Defense Mobilization. In referring to the report of the increased rate of production, he said: "If I were this country's principal enemy, I would be frightened by that report."

The average American, including Mr. Wilson, is deeply impressed with the prodigious industrial capacity of this country. He remembers vividly how in the last war we buried our enemies under an avalanche of industrial output. What he forgets is that *a titanic mass of weapons calls for a titanic mass of men to wield them.* In the war of tomorrow, that titanic mass of men will be not on our side but on the enemy's side! If the weapons we produce on a prodigious scale are to implement the "balanced forces" strategy—which means ground war on Russian terms—then the enemy will not be frightened. He will be encouraged.

Mr. Wilson, in using his great production talent to implement the current strategy, has naturally taken for granted that its basic premises are right. But if our gigantic industrial machine is allowed to gather great momentum in the wrong direction, we will be unable to re-direct it in time. We must think and act now.

THE central question before America today is whether it shall be primarily a land-, sea-, or air-power nation. It cannot be all three at the same time. I for one believe profoundly that only powerful continental air force can save American civilization—the industrial arsenal of the free world—from destruction by atomic and other bombing. Only the deterrent of American long-range striking air power, operating directly from our shores, can shield the rearmament of Europe. Only air power can provide an effective answer to the submarine menace. Above all, only through the air can we marshal a force, superior both in equipment and numbers, for a genuine offensive to destroy the enemy war potential at its source —thus preventing air attacks on America and disarming the teeming Communist hordes.



In the light of these military facts, it seems to me, we should not assign a *single billion dollars* for defense on the surface, or for bolstering Allied strength, unless we are prepared simultaneously to channel *two billions* into United States Air Force. For that force is the heart and core of security for ourselves and other freedom-loving peoples.

With control of the air ocean enveloping the whole globe in our hands, our position would be analogous to Great Britain's in the Nineteenth Century: A small island off Europe in effect gave mankind a century of peace, the *Pax Britannica.* It did this without militarizing or regimenting its people, in a period of expanding democracy and individual freedoms. This miracle was possible because Great Britain did not attempt to be supremely strong on land and sea at once. It put first things first. Living in an era when water was the decisive medium for carrying destruction to enemies and enforcing one's will, it channeled practically its whole military potential into sea power. Every Britisher was a sailor in his heart even if he never went to sea. England attained command of the seas through a superior fleet-in-being. That factor was a guarantee of time to build an army if and when necessary.

Today the air has become the primary medium of global power. An air-force-in-being capable of commanding the skies can enforce its will on everything below. If we hold our effort on land and sea to a minimum, and channel our resources into long-range inter-hemispheric air power, we likewise can be supremely strong without risk of military regimentation.

The tragedy of our situation, as I

(*Continued on page* 46)

Mr. Fleischmann

Here Is America's Production Foreman . . .

Meet Manly Fleischmann

As America's defense effort moves out of its initial warmup stage into a full dress partial mobilization, complete with a controlled materials plan allocating the "big three" metals, steel, copper and aluminum, one thing appears certain. The obvious fact is that all of America's registered engineers are going to have to live with a great many decisions made by Manly Fleischmann, operating head of America's defense effort.

Mr. Fleischmann combines in one person the two top operating jobs in our defense production establishment, Administrator of the Defense Production Authority, and Administrator of the National Production Authority.

Only Charles E. Wilson, Director of Defense Mobilization, outranks Mr. Fleischmann. Upon him falls the job of making the day to day decisions which can spell success or failure of our production program. Every mine, mill, factory and business in America is operating subject to priorities decisions he makes.

What kind of person is the man who bears such awesome responsibility?

To get the answer to that question, the AMERICAN ENGINEER presents a profile of Administrator Fleischmann, and carries a personal message from him to its readers.

ONLY 43 years old, Mr. Fleischmann has held an astonishing number of positions of national importance. In addition to the two top jobs he now fills, Mr. Fleischmann has served as Assistant General Counsel of the Office of Production Management and held the same title with the War Production Board during World War II. Later, he was an OSS officer directing espionage and sabotage behind Japanese lines in Asia. Out of uniform, he was appointed General Counsel of the State Department's Foreign Liquidation Mission.

He was slated to head an E. C. A. mission to Burma with the rank of Minister when Secretary of Commerce Sawyer intervened and appointed him General Counsel of the newly-formed National Production Authority. When General William H. Harrison, head man at NPA, moved up to become boss of the Defense Production Authority, Fleischmann was appointed Administrator of NPA. He was recently confirmed by the Senate as head man of DPA, too.

Mr. Fleischmann has outdone that well known chronicler of success stories, Mr. Horatio Alger, and added some real life melodrama to his career as well. Take his adventures as an American espionage agent during World War II, for example.

When Fleischmann entered active duty with the Navy in August, 1943, his services were requested by Gen. William "Wild Bill" Donovan, head of the super-secret Office of Strategic Services. Gen. Donovan knew Fleischmann as a fellow lawyer in Buffalo, N. Y., and was convinced that he was the man to find out what the Japanese were up to in southeast Asia.

Fleischmann was no armchair cloak and dagger man. For 17 months he and his men operated in the front lines of the deadly jungle warfare. "We played tag with the Japanese all over Burma," he recalls. It was a deadly game of tag, played for keeps. American espionage and sabotage were directed from his headquarters. He was decorated by both the United States and the government of Siam for his work.

NO Horatio Alger character ever held more humble jobs during his college career as Mr. Fleischmann—nor rose so fast to occupy more important jobs later.

For summer jobs he worked as a ditch-digger, a bellhop on a Great Lakes steamer, a farm hand, a bank clerk, and a broker's clerk. With some friends, he organized a small newspaper and sports syndicate and sent material from Harvard College (his alma mater) to New York and New England newspapers.

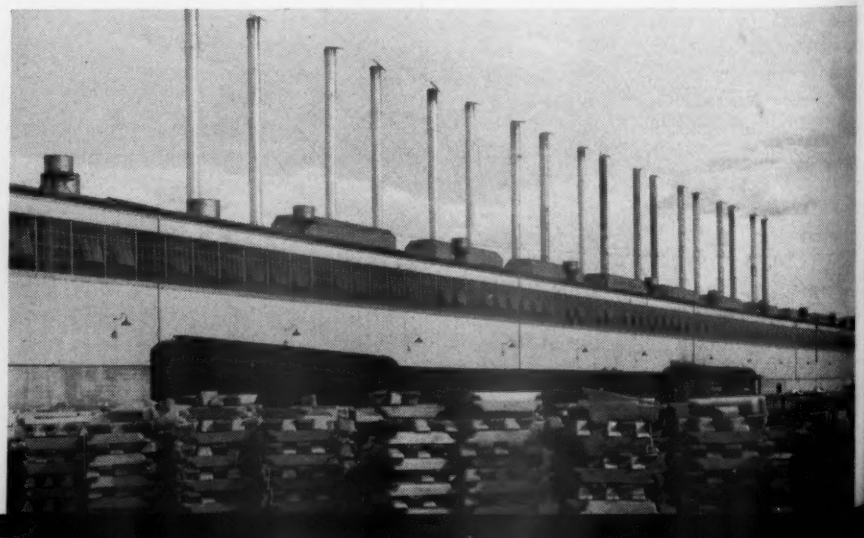
With a chuckle, he recalls that he greatly increased the space given his stories in the Fall River, Mass., papers by writing with great gusto about the not-very-inspiring deeds of a local boy who played on the Harvard football team.

After graduation, Mr. Fleischmann took a "flyer" in the advertising business. "My firm was the greatest flop in the history of advertising," he said. It went out of business and he went into the serious practice of law. He went into business with his father and, in short order, became a leader of the bar. One of his early cases was against Robert H. Jackson, now on the United States Supreme Court. Fleischmann won. He became a lawyer's lawyer, expert in digging up hitherto unheard of points of law. His rise to fame and fortune was in the Horatio Alger tradition.

Mr. Fleischmann has a message for readers of the AMERICAN ENGINEER.

"There is no group in America more important to the defense effort than the professional engineers," he said. "In these days of materials shortages, when utmost production must be obtained from our sometimes limited supplies of essential materials, engineers can perform an especially valuable service to our country by seeing that everything goes as far as it possibly can."

Mr. Fleischmann asks engineers to help during the critical shortage of materials



Interview

(*Continued from page* 13)

nounced that it hired 276 men from the 1951 graduation classes. I am sure that there must be a number of young graduate engineers in that group.

Q. *Leaving Atomic Energy for a moment, Dr. Glennan, we would like your thoughts on some other problems now facing the engineering profession. As you well know, engineers seem reluctant to get into public life to the extent as the lawyers and the doctors. Do you think the engineer's education should be broader and with greater emphasis on the humanities?*

A. My answer is an unequivocal "Yes." Increasingly, the engineer is being asked to assume management and civic responsibilities. As our industrial and governmental problem becomes more complex, the analytical mode of thought and approach of the competent engineer gives him special qualifications for these broader duties. In these activities a concern for human relations, a broad understanding of good citizenship and of the underlying structure of western civilization and our own unique economic and political responsibilities and opportunities begin to assume great importance.

A concern for and a willingness to make a place in the curricula for greater emphasis on the humanities and social sciences is the mark of a good engineering college today. I could discourse on this for hours but I think I have said enough to indicate my deep convictions on this subject.

Q. *As president of Case Institute, could you tell us if that school sought to interest the student in other than technical education? If so, how was it done? (Dr. Glennan is on leave from Case to serve on the Atomic Energy Commission.)*

A. Case Institute of Technology grants degrees through the doctorate only in the various fields of science and engineering. Within the past four years, Case has modified its curricula to provide additional time for other than technical studies. At the same time, a new Division of Humanities and Social Studies has been created and work in these fields is being completely revised. Additional staff members were appointed and the assistance of the country's leading scholars was enlisted. This program has as its objectives the following:

(1) To give the engineering student a depth of perspective in time that is essential to civilized life and to teach him the rich heritage of Western Civilization in thought, in aspiration, in institutions, in the great expressions of the human mind, and in the arts.

(2) To give him a knowledge of his responsibilities as an American citizen.

(3) To prepare the engineering student to express his ideas clearly and forcefully in both speaking and writing.

(4) To provide him with resources to continue his interest in one or more phases of the humanities and social studies after his graduation.

Q. *Do you think the Atomic Age will place a greater value on the engineer and his abilities?*

A. My answers to the two questions immediately preceding constitute a good reply to this question. There is no doubt in my mind that the engineer is destined to play an increasingly important role in all phases of our civilization. Hence, my preoccupation with providing him a better and more complete understanding of the economic, political and cultural facets of the world in which he lives.

Q. *What do you think the youthful professional engineer can do to better prepare himself both professionally and spiritually for the Atomic World ahead?*

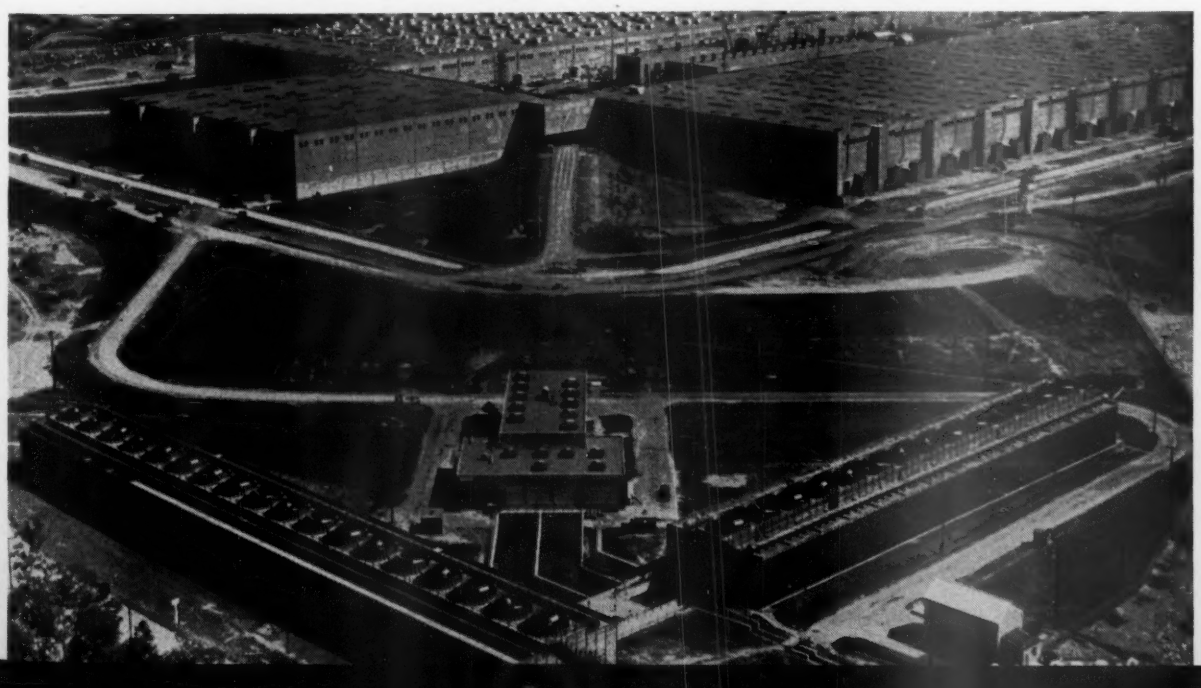
A. He can adhere consciously to the tenets of the code of professional engineers. He will need to continue his study of his own subject *plus* those corollary matters that deal with human beings —their strengths and their frailties.

Q. *What effect will temporary peace have on our defense program?*

A. Temporary peace should have no immediate effect on our defense program. Undoubtedly, however, there will be a tendency to let down, to return to the kind of normalcy that marked our frantic demobilization after World War II. I do believe that sober heads will be effective in continuing the sensible strengthening of the position of the Western World so that our efforts at achieving a lasting peace can be made from a position of strength and honor rather than from weakness.

Thank You, Dr. Glennan.

Here at much discussed Oak Ridge, Tenn., is the immense Clinton Engineer Works.



Civil Defense

(*Continued from page* 21)

specific duties will be an early task following plan preparation. The movement of population groups into surrounding communities will also require advance planning and preparation, not only by the receiving communities but also by State officials. It will not be sufficient to assign or billet evacuees on the basis of bed space alone. It will be necessary to determine the added population which may be received and given adequate care by one or more of a number of factors, bearing in mind that the war emergency and time will not permit any sudden increase in capacity of facilities and that advance planning cannot insist on provision of added facilities in case a target city might be attacked.

The facilities to be considered in advance planning include water supply capacity, sewer systems and sewage treatment, refuse collection and disposal, feeding facilities including restaurants, emergency feeding centers and temporary establishments. There may well be other guiding factors which only an adequate survey can bring to the attention of the planners.

MILK and food sanitation has become one of the most important activities of health departments in recent years. Its importance, in order to prevent the occurrence of milk- or food-borne epidemics of disease, following enemy attack, will be increased, requiring added vigilance coupled with the training of volunteers in order to provide the necessary sanitary safeguards.

The sanitary engineer and the sanitarian must anticipate all possible hazards from a lack of adequate milk and food sanitation and provide for sanitary protection during planning and operations. The situations created by enemy attack may be complex. Milk-producing areas may be cut off and plans must provide for alternate pasteurization and processing. Milk pasteurization plants, food-processing plants, slaughter houses, food storage warehouses, cold-storage plants and frozen food lockers may be destroyed, damaged, or made unavailable because of a loss of power, water, transportation facilities, or even because of blocked streets and tracks.

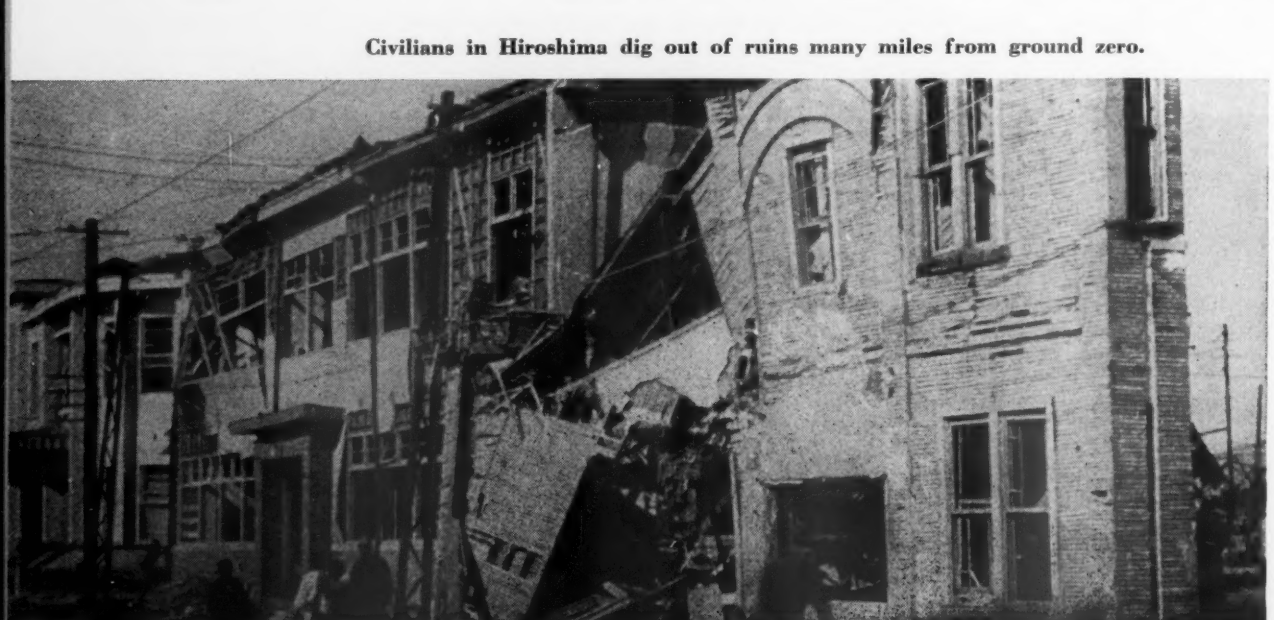
Perishable foods must be inspected, examined and either processed to preserve otherwise usable food stores, or destroyed. Other foodstuffs must be examined and made available or set aside, if otherwise usable, when contaminated with radioactive particles. As no foodstuffs will be needlessly destroyed, if not contaminated, the services of sanitary engineers and the sanitarians will be needed to make the necessary decisions regarding the utility of foodstuffs. Restaurants, local food stores, markets, grocery stores and all other food establishments will require increased inspection and decision regarding the use of food stores damaged or contaminated under enemy attack. The trained sanitary engineer and sanitarian can do little more than give expert supervision. Trained volunteers must carry the brunt of inspection and training programs will be a major part of pre-disaster planning.

There are a number of other tasks with which the sanitary engineer and his staff in health departments will be faced. These tasks may not be presented immediately but will become increasingly important each successive day. Where sewers are damaged, sewage may be permitted to run in street gutters and into storm systems until sewer repairs are made. Sewage treatment plants may be put out of commission. In either case raw sewage will be discharged into cellars, excavations, low areas, or natural water courses. Each instance will require investigation and decision for action and down-stream communities must be notified if their water supplies will be affected.

Industrial wastes will offer special problems as many of these might be toxic. Refuse collection and disposal is not important at first but will become a nuisance after ten days to two weeks without attention. Garbage collection and disposal must continue shortly after fires are under control and active street-clearing and cleaning operations have begun as uncovered garbage provides food for stray animals, rodents and flies. The debris and rubble from destroyed buildings will furnish ideal harborage and breeding places for rodents. Putrescible material will furnish food and breeding places for flies while stagnant pools will contribute, in season, to an increased mosquito population.

The health department must plan for an active rodent and insect control program beginning not less than a week following the disaster. Without control and with food and shelter available, these pests will increase manyfold and will not only add to the economic losses suffered but will present an increasing hazard, as carriers of disease, to a population that may have been deprived of many of its accepted safeguards. Laundries and dry-

Civilians in Hiroshima dig out of ruins many miles from ground zero.



cleaning establishments will be of particular concern where used to decontaminate clothing and fabrics contaminated with gases and radioactive particles. Decontamination in itself presents a new and special problem for the sanitary engineer. Decontamination of surfaces, of areas, and of equipment will be accomplished by the technical services of civil defense but the detection and definition of contamination will rest with the sanitary engineer. The decontamination of personnel and of clothing will be the responsibility of the health services but, other than for the injured, the sanitary engineer must plan for facilities for personnel and for clothing and fabrics, particularly at evacuee centers.

There are other problems and situations which will arise, following enemy attack, and which will need the advice and guidance of the sanitary engineer. Working in close cooperation with all civil defense services and particularly with all branches within the health services, the sanitary engineer and his staff can and will do a great deal to prevent loss of life and of health and to mitigate the effects of an enemy-created disaster.

The Importance of Rescue Training

By LLOYD A. BLANCHARD,
Director, Rescue Service Division, FCDA

OLD concepts of the effect of enemy air attack must be scrapped in light of new intelligence. We are safe in assuming that the bombs dropped on the two Japanese cities were in a sense a sort of "cap pistol" attack compared with the bombs that can be dropped today.

With reasonable air protection and a warning of an attack, we must realize that a United States city of 250,000 population will, nevertheless, suffer 60,000 casualties of which probably 30,000 will survive. A large number of the survivors will be so trapped beneath debris that their only hope of continued survival is a highly competent rescue service.

A thoroughly realistic estimate of the minimum number of rescue squads that this country will need in the wake of a concerted attack is 10,000. These squads will require a quarter of a million volunteer workers competently trained.

A rescue squad is compared of three rescue teams of eight men each in order to provide "around-the-clock shifts" and each team has a leader and assistant leader. Simple mathematics will indicate the recruitment and training loads; 10,000 squads mean 60,000 leaders and 180,000 team members. Although the recruitment problem is almost entirely that of the State and local civil defense organization, the Rescue Service Division, FCDA, expects to assist and advise to the fullest extent.

Our study of the structural damage in England, Germany and Japan, after air attacks, shows an almost incredible mass of twisted steel, masonry rubble, shattered wood timbers of all sizes, piles of furniture and other debris. Lacking actual experience in the U. S., it was obvious that we must, as closely as possible, simulate post attack conditions in order to properly train our rescue personnel. Based on research studies on the information and data from England, Germany, and Japan, we have developed several facilities which combined make up what we call the "Rescue Training Street." You must, of necessity, view these sketches as simulating typical air attack damage to typical structures in the United States. Only three of our six facilities are shown here.

Figure 1 shows a two-story and basement wood frame house and is probably the most common type of construction to be found in the United States, particularly in the industrial areas of the East and Midwest.

Present day trends are toward the one-story "rambler" type of house which is generally found in the newer outlying suburban areas. However, for the purpose of simulating typical city residences, it was decided that a residence of the 1900-1915 period would be the most representative type for a training "set."

Analysis of the effects of bombing in Japan and the effects of explosion damage in this country indicated that wood frame buildings generally collapse in fairly large panel sections; walls, for example, would "come apart," not so much in the form of loose timber and boards, but in panels composed of studs and siding, or floor boards and joists still somewhat intact. These buildings would be wracked literally (distorted) resulting in wall panel failure and collapse of floor and roof framing. Many protective voids would be formed in the debris. By translating these facts into a training "set," the damage will be portrayed with some degree of accuracy and realism.

The framing of these typical houses generally consists of floor joists spanning half the width of the house supported by a central bearing partition. In the basement, a built-up wood girder resting on two or three brick piers, spaced at 8 or 10 foot intervals, supports the bearing partition above. The failure of such a structure, by virtue of the collapse of the brick piers, is indicated in the illustration.

Once the type of damage and collapse has been determined and reproduced in the training "set," it is possible to outline the various types of rescue exercises to be carried on in this particular structure. The general extent and variety of these rescue exercises are also graphically illustrated in the drawing.

The access tunnel, which is shown on the drawing will make possible the placement of simulated casualties in the basement. The use of "live" casualties creates forceful realism which cannot be duplicated by using "dummies" and also ensures careful workmanship on the part of the trainee in removing debris and extricating the victim.

To further emphasize the need for care and skill in rescue operations, a simulated electric service is provided in the basement of this "set." Loose electric wiring connected to a special system will give ample warning.

Figure II. This building with masonry walls, wood floor and roof joists, represents a residential type found in most urban areas of the United States, particularly in cities having a population in excess of 30,000. This building type is representative of the semi-detached house, the four-family flat.

Figure I

TWO - STORY AND BASEMENT WOOD FRAME HOUSE

E X E R C I S E S

3. ELECTRIC SERVICE - OVERHEAD
4. SEWER SERVICE - DRAINAGE
6. CASUALTY HANDLING
7. LOCATING CASUALTIES - SEARCH AND DETECTION
9. USE OF RESCUE VEHICLE AND EQUIPMENT
10. CUTTING AND DISMANTLING WOOD PANELS
12. USE OF LADDERS
13. HOISTING AND LOWERING OF EQUIPMENT AND CASUALTIES
15. HANDLING OR TUNNELING - WOOD AND MASONRY DEBRIS
18. LIFTING, BRACING AND STABILIZING - WOOD - FLOOR - WALL AND ROOF PANELS
20. BRACING AND SUPPORTING IN PLACE - FLOORS AND ROOF PANELS
21. EARTH TUNNELING AND SHAFTING - BRACING AND SHEATHING
23. ACCESS TUNNEL FOR SIMULATED CASUALTIES

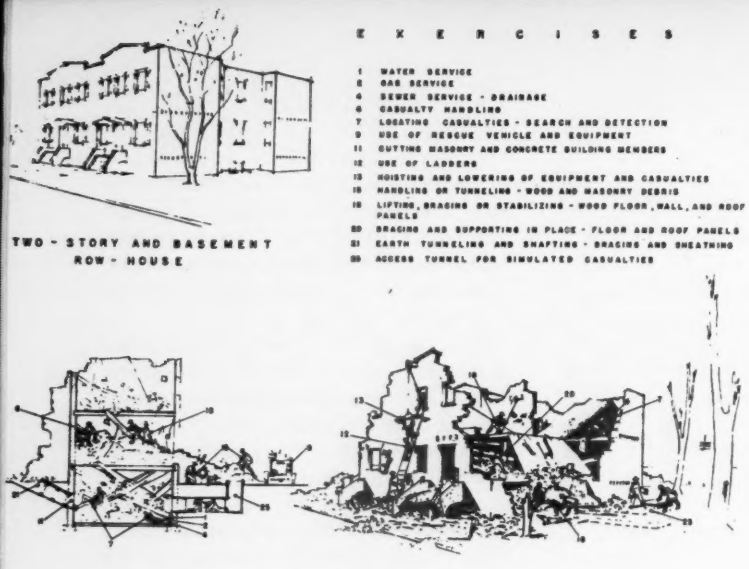

TWO - STORY AND BASEMENT
ROW - HOUSE
E X E R C I S E S
1 WATER SERVICE
2 GAS SERVICE
4 SEWER SERVICE - DRAINAGE
6 CASUALTY HANDLING
7 LOCATING CASUALTIES - SEARCH AND DETECTION
9 USE OF RESCUE VEHICLE AND EQUIPMENT
11 CUTTING MASONRY AND CONCRETE BUILDING MEMBERS
12 USE OF LADDERS
13 HOISTING AND LOWERING OF EQUIPMENT AND CASUALTIES
15 HANDLING OR TUNNELING - WOOD AND MASONRY DEBRIS
19 LIFTING, BRACING OR STABILIZING - WOOD FLOOR, WALL, AND ROOF PANELS
20 BRACING AND SUPPORTING IN PLACE - FLOOR AND ROOF PANELS
21 EARTH TUNNELING AND SHAFTING - BRACING AND SHEATHING
25 ACCESS TUNNEL FOR SIMULATED CASUALTIES

Figure II

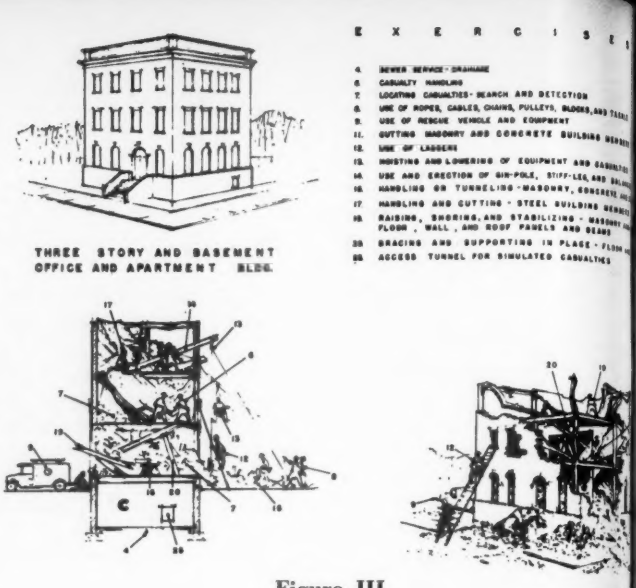

THREE STORY AND BASEMENT
OFFICE AND APARTMENT BLDG.
E X E R C I S E S
4 SEWER SERVICE - DRAINAGE
6 CASUALTY HANDLING
7 LOCATING CASUALTIES - SEARCH AND DETECTION
9 USE OF ROPES, CABLES, CHAINS, PULLEYS, BLOCKS, AND TACKLE
9 USE OF RESCUE VEHICLE AND EQUIPMENT
11 CUTTING MASONRY AND CONCRETE BUILDING MEMBERS
12 USE OF LADDERS
13 HOISTING AND LOWERING OF EQUIPMENT AND CASUALTIES
14 USE AND ERECTION OF GIN-POLE, STIFF-LEG, AND BALANCE
15 HANDLING OR TUNNELING - MASONRY, CONCRETE AND
17 HANDLING AND CUTTING - STEEL BUILDING MEMBERS
19 RAISING, SHORING, AND STABILIZING - MASONRY
FLOOR, WALL, AND ROOF PANELS AND BEAMS
20 BRACING AND SUPPORTING IN PLACE - FLOOR
25 ACCESS TUNNEL FOR SIMULATED CASUALTIES

Figure III

and the two-story apartment or tenement house. Since this type of dwelling was more commonly constructed in the period from 1890 to 1920, it is generally to be found in the downtown areas of most older cities.

The construction of a row-house is, typically, the framing of single span wood joists between masonry party walls. The weakening or destruction of these side walls would cause the floor panels to collapse in a horizontal or "pancake" manner. In other words, the floor and roof panels would tend to drop in horizontal layers, held apart by debris, furniture, etc. This type of collapse would provide the rescue problems indicated on the accompanying illustration.

Water and gas services will be installed in the basement of this building in order that trainees may become familiar with methods of handling these utilities. The water service can be made to simulate a broken water line which would create a flooding problem, unless the trainee has knowledge of proper methods of sealing off the break. Valved floor drains will be installed which will allow the basement to be flooded or drained as occasion demands.

A typical simulated gas service will be installed in this building which will require the trainee to take the necessary measures to stop the leak before proceeding with rescue operations. This will furnish the trainee with first-hand experience in the use of breathing apparatus.

Figure III. This building type, for either apartment or office occupancy, is typical of many structures built during the period from 1920 to 1930. The use of steel skeleton construction was then beginning to replace the wall bearing structures of previous eras and structural steel floor and roof construction was gaining in favor over wood joist framing.

While it is true that this type of construction is commonly used even at the present time, the reason for simulating a building of the vintage shown here is the fact that so many buildings in our urban business districts were erected during the "twenties," and, therefore, could be considered as logical prototypes for a training "set."

The exterior walls of these structures are generally brick-faced, with hollow clay tile back-up. Floor slabs are usually reinforced concrete over light beams. Partitions are built of hollow clay tile or gypsum blocks, plastered.

Analysis of the effects of bomb damage on this type of construction disclosed many examples in Britain, Germany and Japan. There are some edifying examples of this type of collapse to be found in the United States, not, of course, from bomb damage, but as a result of explosions, particularly one which occurred in Texas City, Texas, in 1948.

From these data it can be predicted that considerable wracking and twisting of the steel skeleton will result. Since the exterior walls are light in weight and serve merely as a skin-covering, a large quantity of rubble will be present. Floor panels will also collapse if the wracking and twisting is severe enough to break the connections. Partitions and plaster will fill each level with debris.

It is proposed to construct this training set so that it will simulate most of the conditions with which rescue workers will have to cope in a building of the type herein discussed.

Indoor training "sets" are located in the basement of this structure and will be constructed as a classroom for the study of water, gas, electric, and sewer service installations, as well as providing training under conditions of darkness and in confined spaces. Also, the access tunnel will be used to instruct the trainee in the proper techniques of handling casualties in confined spaces or in tunnels.

The FCDA will establish three training centers in the U. S. for training instructors in the various elements of civil defense. The first of these has been located at Oklahoma A & M College at Stillwater, Oklahoma, and was activated on July 13, 1951. The second will be located at St. Mary's College, a short distance from Berkeley, and was activated August 4, 1951. The site for the Eastern Training Center has not been determined.

A full "Rescue Training Street," comprising eight (8) "sets," will be constructed at each training center, and it is anticipated that full-scale training of rescue instructors will get under way in about ninety (90) days.

The most desirable source of recruitment for rescue teams is the construction industry. Men with experience in the various building crafts, carpentering, rigging, shoring and bracing excavating, steel erecting and similar operations, will take naturally to training as instructors or members of rescue teams. In addition to skill, considerable physical endurance is required in many of the rescue problems.

We fully realize the job ahead in the recruitment and training of this huge force of rescue team leaders and members. It must be remembered, however, that the only aid that entrapped persons can expect in order to come out alive is the rescue service. Participation in this most vital phase of civil defense can be most self-satisfying. We believe the rescue service to be the most important and dramatic of all civil defense services and that as we properly present its functions and objectives to the public, we will get the necessary support and participation.

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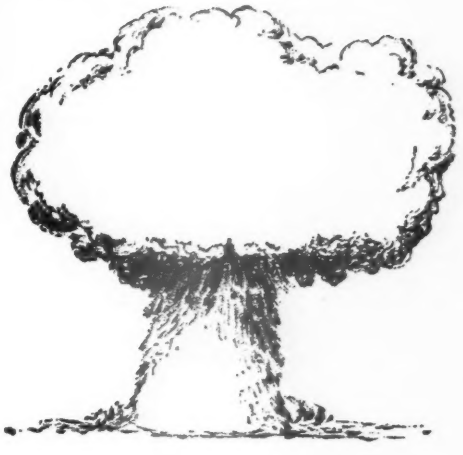

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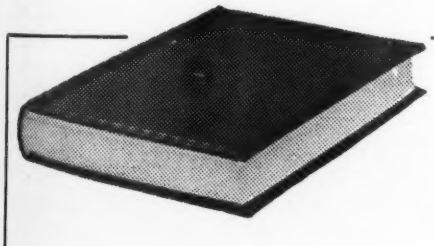

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Air Power

(*Continued from page* 39)

see it, is that the crucial concept of strategic command of the air clear around the globe is not understood by our military leaders. It happens to be a completely new doctrine, requiring a new military art to implement it. Annapolis and West Point are not yet truly equipped to impart this new knowledge.

Air power on the whole continues to be treated today simply as additional firepower for our surface forces. Only its ability to destroy is understood. But the fact is that, like sea power in the past, air power has become the greatest geopolitical force. It can carry our culture, the concrete evidence of our way of life, quickly to all four corners of the earth. From the outset of hostilities, air power could ignore Iron Curtains to carry a message of hope to the enslaved people of the Communistic world.

It would engage in a dual job. It would carry destruction to the Soviet masters, annihilating their citadels of power, their communications and transportation so they could no longer wage war or oppress their people. But at the same time it would drop leaflets, deliver the necessities of life, and even land our Marines to help the people in their struggle against the regime. No longer restricted by diplomatic barriers, air power can call upon all the subjects of the Kremlin tyrants to revolt—and help them to do so. Literally millions of small radio sets, for example, could be dropped throughout the Soviet area, so that the Voice of America could be heard. And our voice would proclaim "Death and destruction to the rulers, freedom to the people!"

WE know that the aircraft has been branded a "weapon of mass destruction." That indictment is unfair and unreasonable. All weapons are destructive: witness the incalculable havoc wrought on Korea as land armies moved back and forth. The fact is that any major weapon, if used unskillfully and without restraint, can become a mere tool of mass destruction. A knife in the hands of a surgeon is an instrument of mercy; in the hands of a butcher it becomes an instrument of slaughter.

Air power is a highly technological and scientific military force. Wielded by those who understand its laws and its uses, it can achieve its objectives with a minimum of damage. With the new electronic devices developed since the last war, its accuracy is uncanny. Air power in the hands of a civilized, technologically advanced nation can be the most humane of all forces. By striking skillfully at the vital spots of the enemy's military anatomy, it can paralyze him and subjugate his will with a minimum of destruction and loss of life on both sides.

Men of the 2nd Engineer Special Brigade pour gasoline on a cave in Korea to force the enemy out. Is this rugged, ground fighting necessary?

The struggle in which mankind is today engaged, let us bear in mind, is not a classic war of possession. The fact that the foot soldier can hold a piece of ground is no longer vital. The rules of classic warfare are no longer applicable. We are fighting an ideological war, a revolution on a global scale. Whether in its cold or its hot variants, ours is a war of liberation. We cannot hope to win with bayonets, by killing those whom we would free, and destroying the very lands we aim to liberate. We must strike selectively at the source of the power which holds down those people. We must disarm their masters. We must win the war by striking at the core of the Soviet regime, destroying the very substance of war-making, without which it will be unable to resist.

Only air power can accomplish this unique assignment. The urgent need for America is to raise human conflict to the highest possible level of science and technology, where America has no peers. On that level the natural advantages of our country—its industrial and engineering genius, can become decisive. Only in that way can we force an adversary to accept combat on our terms—instead of fighting on his terms, as in Korea, through primitive methods where his sheer numbers tell the story.

I join in the great respect in which all Americans hold the architects of victory in the last struggle. But the new situation calls for new leadership. Those raised in the tradition of surface warfare are literally incapable of implementing a strategy of global air power. Military concepts are not put on and taken off like different garments for different climates. They are products of a lifetime of education and experience, expressing deep-rooted military philosophy.

Fortunately, our country has in its service a generation of superb airmen nurtured and tempered for the strategic job to be done. Some of them have the experience of two world wars under their belts. These airmen are completely at home in this era of air power. Their minds and psychological commitments are in tune with new conditions. The American people can entrust their military destinies to such men without misgivings.

IN short, the change in our strategy can be effected only through a change in our top military leadership. That can come only through a groundswell of enlightened public opinion, strong enough to breach the dams of vested interests and mental inertia alike.

The appalling fact is that the American people do not yet have the facts. Our Air Force representatives in the Pentagon can speak out only within the limits of our official strategy of balanced forces, where air power is in essence an auxiliary. Meanwhile the surface services enjoy the prestige of generations of organized existence plus strong support by many propaganda organizations. The result is a huge and continuous

(*Continued on page* 48)

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Air Power

(*Continued from page 46*)

program in which millions are invested, to keep America sold on obsolete military ideas.

There are no equivalent citizen groups dedicated to the cause of Air Power. Should calamity overtake our nation, the American people will never forgive airmen for being derelict in their duty to carry the truth to them in time.

Those of us who understand the seriousness of the challenge, whether we are airmen or not, have a duty to perform. It is to hammer away day and night, despite setbacks and scorn, on the mind and conscience of the American people. We must see to it that every American becomes an airman in his heart. We must somehow awaken our country to the dangers of fighting a new and revolutionary war with the obsolete methods of the past.

We believe in the basic superiority of our way of life. We are convinced that the tyrannized peoples of the Soviet sphere will not forever endure the ignominy of their enslavement. The processes of inner weakening, for all we know, have gone further than the outside world suspects. In short, we count on the ultimate supremacy of our ideology without the cataclysm of war. But because we cannot close our eyes to the alternative, we must have a military program that will insure victory without undermining the free political and economic institutions which to us spell America. Only an invincible American air force is the answer to the human sea of the Communist fighting mass manpower.

If we choose this road, and achieve control of the air, decisive medium of our era, there may be no war. The very existence of an invincible Air Force beyond the industrial and scientific capabilities of the Soviets will serve as a deterrent to aggression and will assure victory if war should come notwithstanding. Only thus can we be invincibly strong, yet remain a free and unregimented people.

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